

SECTION 07 11 13 - BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cold-applied, emulsified-asphalt dampproofing at backfill side of elevator pit side walls.

1.2 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. BASF Construction Chemicals - Building Systems;
 - 2. ChemMasters, Inc.
 - 3. Euclid Chemical Company (The); an RPM company.
 - 4. Gardner-Gibson, Inc.
 - 5. Karnak Corporation.
 - 6. Koppers Inc.
 - 7. Meadows, W. R., Inc.
 - 8. Sika Corporation
- B. Trowel Coats: ASTM D 1227, Type II, Class 1.
- C. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.
- D. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.

2.2 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.
- B. Cut-Back-Asphalt Primer: ASTM D 41.
- C. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended in writing by manufacturer.
- D. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.
- E. Protection Course: ASTM D 6506, 1/8-inch- (3-mm-) thick, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners.
- F. Protection Course: Fan folded, with a core of extruded-polystyrene board insulation faced on one side with plastic film, nominal thickness 1/4 inch (6 mm), with a compressive strength of not less than 8 psi (55 kPa) per ASTM D 1621, and maximum water absorption by volume of 0.6 percent per ASTM C 272.

- G. Protection Course: Extruded-polystyrene board insulation, unfaced, ASTM C 578, Type X, 1/2 inch (13 mm) thick.

PART 3 - EXECUTION

3.1 APPLICATION, GENERAL

- A. Comply with manufacturer's written instructions for substrate preparation, dampproofing application, cure time between coats, and drying time before backfilling unless more stringent requirements are indicated.
 - 1. Apply dampproofing to provide continuous plane of protection.
 - 2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.
- B. Where dampproofing footings and foundation walls, apply from finished-grade line to top of footing; extend over top of footing and down a minimum of 6 inches (150 mm) over outside face of footing.
 - 1. Extend dampproofing 12 inches (300 mm) onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
 - 2. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced," by embedding an 8-inch- (200-mm-) wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.

3.2 INSTALLATION OF PROTECTION COURSE

- A. Where indicated, install protection course over completed-and-cured dampproofing. Comply with dampproofing-material and protection-course manufacturers' written instructions for attaching protection course.

END OF SECTION 071113

SECTION 07 13 26 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes self-adhering modified bituminous sheet wall waterproofing underlayment applications.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Sample warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard materials-only warranty in which manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.
 - 1. Warranty Period: Five years from date of Recommendation of Acceptance.

PART 2 - PRODUCTS

2.1 MODIFIED BITUMINOUS SHEET WATERPROOFING

- A. Modified Bituminous Sheet: Minimum 40-mil (1.02-mm-) nominal thickness, self-adhering sheet consisting of rubberized asphalt laminated on one side to a 4-mil- (0.10-mm-) thick, polyethylene-film reinforcement, and with release liner on adhesive side.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following: W. R. Grace is specified herein as a standard of quality and construction.
 - a. Carlisle Coatings & Waterproofing Inc. – Miradri 860/861
 - b. Grace Construction Products; W.R. Grace & Co. -- Bituthene 3000.

- c. American HydroTech, Inc. – VM 60.
 - d. Henry Company – Blueskin SA.
2. Physical Properties:
- a. Overall thickness: 40 mil (1.5 mm).
 - b. Tensile Strength, Membrane: 325 psi (1.7 MPa) minimum; ASTM D 412, Die C, modified.
 - c. Ultimate Elongation: 200 percent minimum; ASTM D 412, Die C, modified.
 - d. Low-Temperature Flexibility: Pass at minus 20 deg F (minus 29 deg C); ASTM D 1970.
 - e. Crack Cycling: Unaffected after 100 cycles of 1/8-inch (3-mm) movement; ASTM C 836.
 - f. Puncture Resistance: 40 lbf minimum; ASTM E 154.
 - g. Water Absorption: 0.2 percent weight-gain maximum after 48-hour immersion at 70 deg F (21 deg C); ASTM D 570.
 - h. Water Vapor Permeance: 0.05 perms (2.9 ng/Pa x s x sq.m) maximum; ASTM E 96/E 96M, Water Method.
 - i. Hydrostatic-Head Resistance: 230 feet (60 m) minimum; ASTM D 5385.
3. Flashing Strips: Self-adhering, rubberized-asphalt strips of same material and thickness as sheet waterproofing.

2.2 AUXILIARY MATERIALS

- A. General: If full adherence to substrate cannot be attained, furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
 - 1. Furnish liquid-type primer and/or auxiliary materials that comply with VOC limits of authorities having jurisdiction.
 - 2. Hi-tack primer/adhesive binder as recommended by manufacturer to achieve bonding quality and performance.
- B. Metal Termination Bars (if required): Aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick, predrilled at 9-inch (229-mm) centers.

PART 3 - EXECUTION

3.1 MODIFIED BITUMINOUS SHEET-WATERPROOFING APPLICATION

- A. Prepare surfaces and install modified bituminous sheets according to waterproofing manufacturer's written instructions and recommendations in ASTM D 6135. Surfaces must be clean and dry.
 - 1. Completely clean all substrates of excess dust, dirt, contaminants, grease or oils.
 - 2. Substrates must be thoroughly dry before installation. If surfaces become wet due to dew, rain, etc. allow to dry before installation.
- B. If full adherence to substrate cannot be achieved, apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will only be covered by sheet waterproofing in same day. Reprime any areas exposed to atmosphere for more than 24 hours.

- C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 3-inch- (75-mm-) minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation. Horizontal seams to be top-lapped by upper membrane course by 3”
 - 1. Apply membrane only when ambient and substrate temperatures are above 25 deg F.
 - 2. Maximum exposure to sunlight = 30 days. If membrane is exposed for any longer period, remove and replace with new.
- D. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.
- E. Seal edges of sheet-waterproofing terminations with flashing strips.
- F. Repair tears, voids, and lapped seams in waterproofing not complying with Manufacturer requirements with methods recommended by Manufacturer. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches (150 mm) beyond repaired areas in all directions.

3.2 PROTECTION, REPAIR, AND CLEANING

- A. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 13 26

SECTION 07 21 00 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Polyisocyanurate foam-plastic board insulation.
 - 2. Glass-fiber blanket insulation.

1.2 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Polyisocyanurate foam-plastic board insulation.
 - 2. Glass-fiber blanket insulation.

1.3 INFORMATIONAL SUBMITTALS

- A. Installer's Certification: Listing type, manufacturer, and R-value of insulation installed in each element of the building thermal envelope.
 - 1. Sign, date, and post the certification in a conspicuous location on Project site.
- B. Product test reports.
- C. Research reports.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indexes **less than 25 and 450** when tested in accordance with ASTM E84.
- B. Fire-Resistance Ratings: Comply with ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from listings of another qualified testing agency.
- C. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

- D. Labeling: Provide identification of mark indicating R-value of each piece of insulation **12 inches (305 mm)** and wider in width.
- E. Thermal-Resistance Value (R-Value): **R-value as indicated on Drawings** in accordance with ASTM C518.

2.2 POLYISOCYANURATE FOAM-PLASTIC BOARD INSULATION

- A. Polyisocyanurate Board Insulation, Foil Faced: ASTM C1289, foil faced, Type I, Class 1 or 2.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Atlas Polyiso Roof and Wall Insulation.
 - b. Carlisle Coatings & Waterproofing Inc.
 - c. Johns Manville; a Berkshire Hathaway company.
 - d. Pac-Clad, Petersen; a Carlisle Company.

2.3 GLASS-FIBER BLANKET INSULATION

- A. Glass-Fiber Blanket Insulation, Unfaced: ASTM C665, Type I; passing ASTM E136 for combustion characteristics.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed; SAINT-GOBAIN.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. Knauf Insulation.
 - d. Owens Corning.

2.4 ACCESSORIES

- A. Insulation for Miscellaneous Voids:
 - 1. Glass-Fiber Insulation: ASTM C764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E84.
 - 2. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.
 - 3. Polyurethane Pour-In-Place Insulation: Closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84, specifically formulated for pour-in-place applications.
- B. Insulation Anchors, Spindles, and Standoffs: As recommended by manufacturer.
- C. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

3.2 INSTALLATION OF CAVITY-WALL INSULATION

- A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately **24 inches (610 mm)** o.c. both ways on inside face and as recommended by manufacturer.
 - 1. Fit courses of insulation between **wall ties and other** obstructions, with edges butted tightly in both directions, and with faces flush.
 - 2. Press units firmly against inside substrates.
 - 3. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 042000 "Unit Masonry."

3.3 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain **3-inch (76-mm)** clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 - 4. For metal-framed wall cavities where cavity heights exceed **96 inches (2438 mm)**, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).
2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.4 INSTALLATION OF CURTAIN-WALL INSULATION

- A. Install board insulation in curtain-wall construction according to curtain-wall manufacturer's written instructions.
 1. Hold insulation in place by securing metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching spandrel glass. Maintain cavity width of dimension indicated on Drawings between insulation and glass.
 2. Install insulation to fit snugly without bowing.

END OF SECTION 07 21 00

SECTION 07 21 19 - FOAMED-IN-PLACE INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Open-cell spray polyurethane foam insulation.
 - 2. Accessories including thermal barrier and ignition barrier coatings.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Product Data: For paints and coatings, indicating VOC content.
 - 2. Evaluation Reports or Certificates: For paints and coatings, indicating compliance with requirements for low-emitting materials.

1.3 INFORMATIONAL SUBMITTALS

- A. Test and Evaluation Reports:
 - 1. Product Test Reports: For each product, for tests performed by qualified testing agency.
 - 2. Research Reports:
 - a. For spray-applied polyurethane foam-plastic insulation, from an agency acceptable to authorities having jurisdiction showing compliance with IBC 2021.
- B. Field Quality-Control Submittals:
 - 1. Field quality-control reports for foamed-in-place insulation.
- C. Qualification Statements: For Installer.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained on applications of spray-applied polyurethane foam-plastic insulation and intumescent coatings, or similar product types and approved by manufacturer.

PART 2 - PRODUCTS

2.1 OPEN-CELL SPRAY POLYURETHANE FOAM INSULATION

- A. Open-Cell Spray Polyurethane Foam: Spray-applied polyurethane foam using water as a blowing agent. Minimum density of **0.4 lb/cu. ft. (6.4 kg/cu. m)** and minimum aged R-value at **1-inch (25.4-mm)** thickness of **3.4 deg F x h x sq. ft./Btu at 75 deg F (24 K x sq. m/W at 24 deg C)**.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Corporation.
 - b. Carlisle Spray Foam Insulation.
 - c. Demilec; a brand of Huntsman Building Products.
 - d. Gaco Western LLC.
 - e. Icynene; a brand of Huntsman Building Products.
 - f. Johns Manville; a Berkshire Hathaway company.
 - g. Lapolla; a brand of Huntsman Building Products.
 - h. SWD Urethane Company.
 2. Surface-Burning Characteristics: Comply with ASTM E84; 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: 450 or less.
 3. Fire Propagation Characteristics: Passes NFPA 285 and NFPA 276 testing as part of an approved assembly.

2.2 ACCESSORIES

- A. Thermal Barrier Coating: Fire-protective intumescent coating formulated for application over polyurethane foam plastics, compatible with insulation, and passes NFPA 286, FM 4880, UL 1040, or UL 1715 testing as part of an approved assembly.
1. Basis-of-Design Product: International Fireproof Technology Inc., DC315 Intumescent Coating
 2. Performance Criteria:
 - a. Finish: Flat.
 - b. Color: Standard Colors.
 - c. VOC Content: 18 g/L or less of water in accordance with EPA 24.
 - d. Solids by Volume: 67 percent.
 3. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 5 or less.
 - b. Smoke-Developed Index: 10 or less.

4. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 5. Topcoat: As recommended in writing by intumescent thermal barrier manufacturer as compatible with substrate materials.
 - a. Decorative Topcoat: 6- to 8-mil (0.15- to 0.20-mm) thick, water-based latex-based paint for interior conditioned spaces recommended in writing by intumescent thermal barrier manufacturer as compatible with substrate materials.
 - b. Protective Topcoat, Interior: 6- to 8-mil (0.15- to 0.20-mm) thick, exterior topcoat, VOC compliant, for interior unconditioned spaces subject to constant high humidity, condensation, or direct contact with moisture.
 - c. Protective Topcoat, Exterior: 6- to 8-mil (0.15- to 0.20-mm) thick, continuous insulation exterior topcoat as a component of exterior wall systems as indicated by Intertek Design Listing BASF/FI 30-90 when installed behind approved claddings.
- B. Ignition Barrier Coating: Fire-protective coating formulated for application over polyurethane foam plastics, compatible with insulation, and in compliance with ICC-ES AC377, Appendix X. Products identified with testing agency markings.
1. Basis-of-Design Product: Subject to compliance with requirements, provide No-Burn, Inc.; Plus ThB intumescent coating.
 2. Performance Criteria:
 - a. Finish: Flat.
 - b. Color: Standard colors.
 - c. VOC Content: 18 g/L or less of water in accordance with EPA 24.
 - d. Solids by Volume: 60 to 70 percent.
 3. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 5 or less.
 - b. Smoke-Developed Index: 0 or less.
 4. Topcoat: As recommended in writing by intumescent thermal barrier manufacturer as compatible with substrate materials.
 - a. Decorative Topcoat: 6- to 8-mil (0.15- to 0.20-mm) thick, water-based latex-based paint for interior conditioned spaces recommended in writing by intumescent thermal barrier manufacturer as compatible with substrate materials.
 - b. Protective Topcoat, Interior: 6- to 8-mil (0.15- to 0.20-mm) thick, heavy-duty protective topcoat, VOC compliant, for interior unconditioned spaces subject to constant high humidity, condensation, or direct contact with moisture.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with manufacturer's requirements for surface treatments, maximum moisture content, and other conditions affecting performance of the Work.
- B. Proceed with coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION

- A. Verify that substrates are clean, dry, and free of substances that are harmful to insulation.

3.3 INSTALLATION

- A. Spray to a thickness to provide the following minimum R values:
 - 1. Roof/attic – R-38
 - 2. Walls – R-15
- B. Comply with insulation manufacturer's written instructions applicable to products and applications.
- C. Spray insulation to envelop entire area to be insulated and fill voids.
- D. Do not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.
- E. Miscellaneous Voids: Apply in accordance with manufacturer's written instructions.
- F. Apply fire-protective intumescent coatings in accordance with manufacturer's written instructions and to comply with requirements for listing and labeling for fire-propagation characteristics and surface-burning characteristics specified.
 - 1. Use equipment and techniques best suited for substrate and type of material applied as recommended by coating manufacturer.
 - 2. Apply coatings to prepared surfaces as soon as practical after preparation and before subsequent surface soiling or deterioration.
 - 3. Apply coatings to produce surface films without holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Produce sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Continuously monitor wet film thickness (WFT) by performing periodic checks to ensure correct thicknesses are applied.
 - 1. Measuring Thickness:

- a. Install medallions prior to applying intumescent thermal barrier coating to measure wet film thickness and dry film thickness.
- b. Perform thickness measurements by measuring representative sample of installed intumescent coating material by means of calipers, optical comparators, or similar devices.

3.5 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

END OF SECTION 07 21 19

SECTION 07 22 00 – ROOF AND DECK INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - 1. Polyisocyanurate Roof Insulation.
 - 2. Gypsum Roof Deck Board
- B. Related sections:
 - 2. Division 07 Section “Sheet Metal Flashing and Trim”.
 - 3. Division 07 Section “SBS Modified Bituminous Membrane Roofing”.

1.3 REFERENCES

- 1. American Society for Testing and Materials (ASTM):
- 2. ASTM C1396 Standard Specification for Gypsum Wallboard.
- 3. ASTM C1289 Standard Specification for Faced Rigid Polyisocyanurate Thermal Insulation
- 4. ASTM D5 Standard Test Method for Penetration of Bituminous Materials.
- 5. ASTM D5147 Standard Sampling and Testing Modified Bituminous Sheet Material.
- 6. Cast Iron Soil Pipe Institute, Washington, D.C. (CISPI)
- 7. Factory Mutual Research (FM):
 - a. Roof Assembly Classifications.
- 8. National Roofing Contractors Association (NRCA):
 - a. Roofing and Waterproofing Manual.
- 9. Underwriters Laboratories, Inc. (UL):
 - a. Fire Hazard Classifications.
- 10. Warnock Hersey (WH):
 - a. Fire Hazard Classifications.
- 11. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
- 12. Steel Deck Institute, St. Louis, Missouri (SDI)
- 13. Southern Pine Inspection Bureau, Pensacola, Florida (SPIB)
- 14. Insulation Board, Polyisocyanurate (FS HH-I-1972)

1.4 SUBMITTALS

- A. Product Data: Provide manufacturer's specification data sheets for each product.
- B. Roofing System Certification: Submit written certification that the roof deck insulation is acceptable for use by the SBS manufacturer as a component of their roofing system.
- C. Provide a sample of each insulation type.

1.5 SHOP DRAWINGS

- A. Submit manufacturer's shop drawings indicating complete installation details of tapered insulation system, including identification of each insulation block, sequence of installation, layout, drain locations, roof slopes, thicknesses, crickets and saddles.
- B. Shop drawing shall include: Outline of roof, location of drains, a complete board layout of tapered insulation components, thickness and the average "R" value for the completed insulation system.
- C. Certification:
 - 1. Submit roof manufacturer's certification that insulation fasteners furnished, are acceptable to roof manufacturer.
 - 2. Submit insulation fasteners, fastening pattern layout(s), and deck/substrate penetration depth(s) that resist the uplift pressures as per the specified SBS modified roofing system.
 - 3. Submit roof manufacturer's certification that insulation furnished and installed is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer's system warranty.
 - 4. Submit written certification that the roof deck insulation is acceptable for use as a component of the SBS manufacturer's roofing system.
 - 5. Submit written certification that the roof deck insulation, used in conjunction with the SBS modified roofing system, passes the UL1256 test for a fire rated assembly, if required.

1.6 QUALITY ASSURANCE

- A. Fire Classification, ASTM E-108.
- B. Manufacturer's Certificate: Certify that the roof system is adhered properly to resist the uplift pressures as per the specified SBS roofing system.
- C. Pre-installation Meeting: Refer to Division 07 roofing specifications for pre-installation meeting requirements.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged.
- B. Store all insulation materials in a manner to protect them from the wind, sun and moisture damage prior to and during installation. Any insulation that has been exposed to any moisture shall be removed from the project site.
- C. Keep materials enclosed in a watertight, ventilated enclosure (i.e. tarpaulins).
- D. Store materials above the ground. Any warped, broken or wet insulation boards shall be removed from the site.

PART 2 - PRODUCTS

2.1 ROOF DECK INSULATION

- A. Polyisocyanurate Board Insulation (MONOLITHIC): ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.
- Qualities: Rigid, closed cell polyisocyanurate foam core bonded to heavy duty glass fiber mat facers, both sides.
 - Thickness: 1.5" minimum, refer to drawing section details.
 - R-Value: 6.0 minimum.
 - Size: 48 inches square maximum size when installed using adhesive.
 - Size: 48 inches x 96 inches maximum size when installed using mechanical fasteners.
1. Subject to compliance with requirements, provide one of the following:
- Commerical Innovations CI Flat.
 - Pre-Approved Equal
- B. Tapered Polyisocyanurate Roof Insulation (TAPERED), including Tapered Sumps; ASTM C1289:
- Qualities: Factory Tapered, closed cell polyisocyanurate foam core bonded to heavy duty glass fiber mat facers.
 - Thickness: 1/2" minimum, see section details for particular thicknesses.
 - Size: 48 inches square maximum size when installed using adhesive.
 - Size: 48 inches x 96 inches maximum size when installed using mechanical fasteners.
 - Tapered Slope: 1/4" : 12" per foot. Rear Roof Area: 1/8" : 12"
 - Tapered Sump Slope: 1/2" per foot.
 - Tapered Crickets: 1/2" : 12" per foot. Rear Roof Area: 1/4" : 12"
2. Subject to compliance with requirements, provide one of the following:
- Commerical Innovations Tapered CI-GC.
 - Pre-Approved Equal
- A. Gypsum Roof Deck Board: ASTM C 1177 or ASTM C 1278, water-resistant gypsum substrate, Class A Fire Rated, 1/2 inch thick.
1. Subject to compliance with requirements, provide one of the following:
- Commerical Innovations Gypsum Fiber Board.
 - Pre-Approved Equal
2. Size: 48 inches square maximum size, installed using adhesive.

2.2 RELATED MATERIALS

- A. Fiber Cant and Tapered Edge Strips: Performed rigid insulation units of sizes/shapes indicated, matching insulation board or of perlite or organic fiberboard, as per the approved manufacturer.

1. Acceptable Manufacturers:
 - a. Johns Manville
 - b. GAF
- B. Provide preformed saddles, crickets, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.
- C. Insulation Adhesive: Dual component high rise foam adhesive as recommended by the insulation manufacturer and membrane manufacturer: Insul-Lock HR by The Garland Company, Inc. or Pre-approved equal.
 1. Tensile Strength (ASTM D412), 250 psi
 2. Density (ASTM D1875), 8.5 lbs. /gal.
 3. Viscosity (ASTM D2556), 8,000 to 32,000 cP.
 4. Peel Strength (ASTM D903), 17 lb. /in.
 5. Flexibility (ASTM D816), Pass @ -70°F
- D. Fasteners: Corrosion resistant screw fastener as recommended and approved by the SBS roofing system manufacturer.
 1. Factory Mutual Tested and Approved #14 fasteners with three (3) inches coated disc, length required to penetrate metal deck one inch by Trufast or Pre-approved equal.

PART 3 - EXECUTION

3.1 EXECUTION, GENERAL

- A. Comply with requirements of Division 01 Section and all project requirements.
- B. Install one lapped base-sheet course and mechanically fasten to substrate according to roofing system manufacturer's written instructions.
- C. Insulation Cant Strips: Install and secure preformed 45-degree insulation cant strips at junctures of roofing system with vertical surfaces or angle changes greater than 45 degrees.
- D. Install tapered insulation under area of roofing to conform to slopes indicated.
- E. 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 1/4 inch with insulation.
 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- F. Install insulation under area of roofing to achieve specified thicknesses and slopes. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
- G. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

- H. Install tapered edge strips at perimeter edges as necessary to fill between the roof deck board and the top of blocking, to direct water away from vertical surfaces , and that do not terminate at vertical surfaces.

3.2 INSPECTION OF SURFACES

- A. Roofing contractor shall be responsible for preparing an adequate substrate to receive insulation.
- B. Verify that work which penetrates roof deck has been completed.
- C. Verify that wood nailers are properly and securely installed.
- D. Examine surfaces for defects, rough spots, ridges, depressions, foreign material, moisture, and unevenness. Do not proceed until defects are corrected.
- E. Do not apply insulation until substrate is sufficiently dry.
- F. Broom clean substrate immediately prior to application.
- G. Use additional insulation to fill depressions and low spots that would otherwise cause ponding water.
- H. Verify that temporary roof, if required, has been completed.
- I. Proceeding with installation means acceptance of substrate.

3.3 PROTECTION

- A. During execution of work covered in this section, the Contractor shall provide protections for the roof insulation from water and wind penetration at the end of each day's work.
- B. Protect the roof insulation in areas that will receive excessive traffic.
- C. All personnel shall wear clean, soft rubber soled shoes for any application work where they may be walking on insulation boards.

3.4 INSTALLATION

- A. Attachment with Mechanical Fasteners:
 - 1. Approved insulation board shall be fully attached to the deck with an approved mechanical fastening system. As a minimum, fastening shall be in accordance with the SBS modified roofing system specification to resist the specified uplift pressures at corners, perimeter, and field of roof.
 - a. Attach insulation utilizing TruFast #14 HD fasteners.
 - b. Consult with SBS roofing system manufacturer for density and fastener patterns required for securing the insulation to the wood roof deck.
 - c. Fastening patterns shall resist the wind uplift pressures per IBC 2015 and ASCE7-10.
 - 2. Placement pattern(s) of fasteners shall be in accordance with the SBS modified

roofing system specification to resist the specified uplift pressures. Zone 1 – 16 fasteners per 4x8 board, Zone 2 – 24 fasteners per 4x8 board and Zone 3 – 32 fasteners per 4x8 board. The greater of the two patterns shall be utilized.

3. Minimum fastener penetration depth into deck shall meet or exceed the same pull- out requirements set forth as stated above for uplift pressure resistance. There is a one (1) inch minimum for metal decks.

B. Attachment with Insulation Adhesive:

1. Ensure all surfaces are clean, dry, free of dirt, debris, oils, loose ore embedded gravel, unadhered coatings, deteriorated membrane and other contaminants that may inhibit adhesion.
2. Apply insulation adhesive directly to the substrate using a ribbon pattern with one half (1/2) inch wide beads 12 inches o.c. in Zone 1, 6 inches o.c. in Zone 2 and 3 using either the manual applicator or an automatic applicator. Adhesive pattern(s) shall be in accordance with the SBS modified roofing system specification to resist the specified uplift pressures. The greater of the two patterns shall be utilized.
3. Immediately place insulation boards into wet adhesive. Do not slide boards into place. Do not allow the adhesive to skin over before installing insulation boards.
4. Briefly step each board into place to ensure contact with the adhesive. Substrates with irregular surfaces may prevent the insulation board from making positive contact with the adhesive. Relief cuts or temporary weights may be required to ensure proper contact.
5. All boards shall be cut and fitted where the roof deck intersects a vertical surface. The boards shall be cut to fit a minimum of one quarter (1/4) inch away from the vertical surface.
6. At the Contractor's option, set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

3.5 CLEANING

- A. Remove debris and cartons from roof deck. Leave insulation clean and dry, ready to receive roofing membrane or roof deck board.

3.6 CONSTRUCTION WASTE MANAGEMENT

- A. Remove and properly dispose of waste products generated during installation. Comply with requirements of authorities having jurisdiction.

END OF SECTION 07 22 00

SECTION 07 25 00 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Building wrap.
2. Flexible flashing.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For water-resistive barrier and flexible flashing, from ICC-ES.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

A. Building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.

1. Products: Subject to compliance with requirements, provide the following provide one of the following:
 - a. Dow Chemical Company; Styrofoam Weathermate Plus Brand Housewrap.
 - b. DuPont (E. I. du Pont de Nemours and Company); Tyvek CommercialWrap
 - c. Typar Metro Wrap, For Commercial Applications.
2. Water-Vapor Permeance: Not less than 50 g through 1 sq. m of surface in 24 hours per ASTM E 96/E 96M, Desiccant Method (Procedure A).

B. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

2.2 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Self-adhesive butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spun bonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. DuPont (E. I. du Pont de Nemours and Company); DuPont Flashing Tape.
 - b. Grace Construction Products, a unit of W. R. Grace & Co.; Vycor Butyl Self Adhered Flashing.
 - c. Protecto Wrap Company; BT-25 XL.
 - d. Typar- Flex Flashing, Peel and Stick

3.1 WATER-RESISTIVE BARRIER INSTALLATION

- A. Cover sheathing with water-resistive barrier as follows:
 - 1. Cut back barrier 1/2 inch (13 mm) on each side of the break in supporting members at expansion- or control-joint locations.
 - 2. Apply barrier to cover vertical flashing with a minimum 4-inch (100-mm) overlap and seal bottom unless otherwise indicated.
- B. Building Wrap: Comply with manufacturer's written instructions.
 - 1. Seal seams, edges, fasteners, and penetrations with tape.
 - 2. Extend into jambs of openings and seal corners with tape.

3.2 FLEXIBLE FLASHING INSTALLATION

- A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.
 - 1. Lap seams and junctures with other materials at least 4 inches (100 mm) except that at flashing flanges of other construction, laps need not exceed flange width.
 - 2. Lap flashing over water-resistive barrier at bottom and sides of openings.
 - 3. Lap water-resistive barrier over flashing at heads (lintels) of openings.

END OF SECTION 07 25 00

SECTION 07 26 00 – UNDER-SLAB VAPOR BARRIER

PART 1 - GENERAL

1.1 SUMMARY

A. Products supplied under this section:

1. Vapor barrier and installation accessories for installation under concrete slabs.

B. Related Requirements:

1. Section 033000 Cast-in-Place Concrete

1.2 REFERENCES

A. ASTM International:

1. ASTM E1745-17 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
2. ASTM E1643-18a Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

B. Technical Reference - American Concrete Institute (ACI):

1. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
2. ACI 302.1R-15 Guide to Concrete Floor and Slab Construction.

1.3 SUBMITTALS

A. Quality Control/Assurance:

1. Summary of test results per paragraph 9.3 of ASTM E1745.
2. Manufacturer's samples and literature.
3. Manufacturer's installation instructions for placement, seaming, penetration prevention and repair, and perimeter seal per ASTM E1643.
 - a. Annotate submittal indicating specific details to be used.
 - b. Submittal to consider all conditions (typical and unique) on the project.
4. All mandatory ASTM E1745 testing must be performed on a single production roll per ASTM E1745 Section 8.1.

B. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Vapor barrier shall have all of the following qualities:
 - 1. Maintain permeance of less than 0.01 Perms [grains/(ft² · hr · inHg)] as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
 - 2. Other performance criteria:
 - a. Strength: ASTM E1745 Class A.
 - b. Thickness: 15 mils minimum
 - c. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1
- B. Vapor barrier products:
 - 1. Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC., (877) 464-7834 www.stegoindustries.com.
 - 2. Perminator 15 Mil Underslab Vapor Barrier by WR Meadows
 - 3. No substitutions.

2.2 ACCESSORIES

- A. Seams:
 - 1. Stego Tape by Stego Industries, LLC
- B. Sealing Penetrations of Vapor Barrier:
 - 1. Stego Mastic by Stego Industries, LLC
 - 2. Stego Tape by Stego Industries, LLC
- C. Perimeter / Edge Seal:
 - 1. Stego Crete Claw by Stego Industries, LLC
 - 2. Stego Term Bar by Stego Industries, LLC
 - 3. StegoTack Tape (double-sided sealant tape) by Stego Industries, LLC

PART 3 - EXECUTION

3.1 PREPARATION

- A. Ensure that the subsoil is approved by Engineer.
 - 1. Level and compact base material.

3.2 INSTALLATION

A. Install vapor barrier in accordance with ASTM E1643.

1. Install vapor barrier in accordance with manufacturer's instructions using typical details. Consult with manufacturer for any unique conditions not addressed with manufacturer's standard details and directions.
2. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
3. Extend vapor barrier to the perimeter of the slab.
 - a. Seal vapor barrier to the entire slab perimeter using Stego Crete Claw, per manufacturer's instructions.
4. Overlap joints 6 inches and seal with manufacturer's seam tape.
5. Apply seam tape/Crete Claw to a clean and dry vapor barrier.
6. Seal all penetrations (including pipes) per manufacturer's instructions.
7. For interior forming applications, avoid the use of non-permanent stakes driven through vapor barrier. Use Beast Form Stake and Beast Foot as a vapor barrier-safe forming system. Ensure Beast Foot's peel-and-stick adhesive base is fully adhered to the vapor barrier.
8. If non-permanent stakes must be driven through vapor retarder, repair as recommended by vapor retarder manufacturer.
9. Use reinforcing bar supports with base sections that eliminate or minimize the potential for puncture of the vapor barrier.
10. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.
11. For vapor barrier-safe concrete screeding applications, install Beast Screed (vapor barrier-safe screed system) per manufacturer's instructions prior to placing concrete.

END OF SECTION 072600

SECTION 07 41 13.16 - STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes standing-seam metal roof panels.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
- C. Samples: For each type of metal panel indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Warranties: Sample of special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Finish Warranty Period: 20 years from date of Substantial Completion.
- C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
 - 1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Energy Performance: Provide roof panels that are listed on the EPA/DOE's ENERGY STAR "Roof Product List" for low-slope roof products.
- B. Energy Performance: Provide roof panels according to one of the following when tested according to CRRC-1:
 - 1. Three-year, aged solar reflectance of not less than 0.55 and emissivity of not less than 0.75.
 - 2. Three-year, aged Solar Reflectance Index of not less than 64 when calculated according to ASTM E1980.
- C. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
 - 1. Wind Loads: As indicated on Drawings.
 - 2. Other Design Loads: As indicated on Drawings.
 - 3. Deflection Limits: For wind loads, no greater than 1/240 of the span.
- D. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E1680 or ASTM E283 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- E. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E1646 or ASTM E331 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).

- F. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E2140.
- G. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
 - 1. Uplift Rating: UL 90.
- H. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.
 - 1. Fire/Windstorm Classification: Class 1A- 90.
 - 2. Hail Resistance: MH.
- I. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 STANDING-SEAM METAL ROOF PANELS

- A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
 - 1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E1514.
- B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and mechanically seaming panels together.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. PAC Clad
 - b. MBCI
 - 2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.

- a. Nominal Thickness: 22 gauge.
 - b. Exterior Finish: Two-coat fluoropolymer.
 - c. Color: Pac-Clad, Slate Gray
MBCI, Slate Gray
3. Clips: One-piece fixed to accommodate thermal movement.
- a. Material: 0.064-inch- (1.63-mm-) nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
4. Joint Type: Double folded.
5. Panel Coverage: 16 inches (406 mm).
6. Panel Height: 1.5 inches (38 mm).

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils (0.76 mm) thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.
1. Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D1970.
 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D1970.
 3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle Residential; a division of Carlisle Construction Materials.
 - b. GCP Applied Technologies Inc.
 - c. Owens Corning.

2.4 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645; cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure

strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Gutters and Downspouts: Formed from same material as roof panels according to SMACNA's "Architectural Sheet Metal Manual." Finish as selected by architect.
- E. Roof Curbs: Fabricated from same material as roof panels, **0.048-inch (1.2-mm)** nominal thickness; with bottom of skirt profiled to match roof panel profiles and with welded top box and integral full-length cricket. Fabricate curb subframing of **0.060-inch- (1.52-mm-)** nominal thickness, angle-, C-, or Z-shaped steel sheet. Fabricate curb and subframing to withstand indicated loads of size and height indicated. Finish roof curbs to match metal roof panels.
- F. Panel Fasteners: Self-tapping screws designed to withstand design loads.
- G. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; **1/2 inch (13 mm)** wide and **1/8 inch (3 mm)** thick.
 - 2. Joint Sealant: ASTM C920; as recommended in writing by metal panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.5 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

2.6 FINISHES

- A. Panels and Accessories:
 - 1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.

- a. Color -
2. Concealed Finish: White or light-colored acrylic or polyester backer finish.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (152 mm) staggered 24 inches (610 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Extend underlayment into gutter trough. Roll laps with roller. Cover underlayment within 14 days.
 1. Apply over the entire roof surface.
- B. Slip Sheet: Apply slip sheet over underlayment before installing metal roof panels.
- C. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 07 62 00 "Sheet Metal Flashing and Trim."

3.3 METAL PANEL INSTALLATION

- A. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.
 1. Install clips to supports with self-tapping fasteners.
 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
 3. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
 4. Watertight Installation:
 - a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
 - b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.

- c. At panel splices, nest panels with minimum **6-inch (152-mm)** end lap, sealed with sealant and fastened together by interlocking clamping plates.
- B. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
- C. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

3.4 CLEANING AND PROTECTION

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

END OF SECTION 07 41 13.16

SECTION 07 42 13.13 - FORMED METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Concealed-fastener, lap-seam metal wall panels.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
- C. Samples: For each type of metal panel indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Warranties: Samples of special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
 - 1. Wind Loads: As indicated on Drawings.
 - 2. Deflection Limits: For wind loads, no greater than 1/240 of the span.
- B. Air Infiltration: Air leakage of not more than **0.06 cfm/sq. ft. (0.3 L/s per sq. m)** when tested according to ASTM E283 at the following test-pressure difference:
 - 1. Test-Pressure Difference: **6.24 lbf/sq. ft. (300 Pa)**.
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
 - 1. Test-Pressure Difference: **6.24 lbf/sq. ft. (300 Pa)**.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, material surfaces.
- E. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 CONCEALED-FASTENER, LAP-SEAM METAL WALL PANELS

- A. Provide factory-formed metal panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners **and factory-applied sealant** in side laps. Include accessories required for weathertight installation.
- B. Creased-Rib-Profile, Concealed-Fastener Metal Wall Panels – **Panel A:** Formed with raised, center-creased, trapezoidal major ribs; with reveal joint between panels.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Pac-Clad
 - b. MBCI
 - 2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, **G90 (Z275)** coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, **Class AZ50 (Class AZM150)** coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Nominal Thickness: 22 gauge
 - b. Exterior Finish: Two-coat fluoropolymer.
 - c. Color: Pac-Clad – Granite; MBCI – Ash Gray
 - 3. Panel Coverage: **12 inches (305 mm)**.
 - 4. Panel Height: **0.875 inch (22 mm)**.
- C. Creased-Rib-Profile, Concealed-Fastener Metal Wall Panels – **Panel B:** Formed with raised, center-creased, trapezoidal major ribs; with reveal joint between panels.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Pac-Clad
 - b. MBCI
 - 2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, **G90 (Z275)** coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, **Class AZ50 (Class AZM150)** coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Nominal Thickness: 22 gauge
 - b. Exterior Finish: Two-coat fluoropolymer.
 - c. Color: Pac-Clad – Slate Gray; MBCI – Slate Gray
 - 3. Panel Coverage: **12 inches (305 mm)**.
 - 4. Panel Height: **0.875 inch (22 mm)**.

2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, **G90 (Z275)** hot-dip galvanized coating designation or ASTM A792/A792M, **Class AZ50 (Class AZM150)** aluminum-zinc-alloy coating designation

unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 - 1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal panels.
 - 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 - 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
 - 2. Joint Sealant: ASTM C920; as recommended in writing by metal panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.4 FABRICATION

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

- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

2.5 FINISHES

A. Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat.
2. Concealed Finish: White or light-colored acrylic or polyester backer finish.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION

- A. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
 1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
 5. Flash and seal panels with weather closures at perimeter of all openings.
- B. Watertight Installation:
 1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels; and elsewhere as needed to make panels watertight.
 2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
 3. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.

- C. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
- D. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

3.3 CLEANING

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

END OF SECTION 074213.13

SECTION 07 55 00 - MODIFIED BITUMEN MEMBRANE 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:
 - 1. (SBS) Modified Bituminous Membrane Roofing.
- B. Related Requirements:
 - 1. Division 07 Section "Sheet Metal Flashing and Trim"
 - 3. Division 07 Section "Roof and Deck Insulation"
- C. Scope of Work:
 - 1. This project consists of removing existing roofing and insulation, installing a new, high performance, fire retardant, SBS modified roofing membrane system. The finished system shall be complete including installation of sheet metal related items, wall panels, roof panels, edge metal and base flashings, and waterproofing. The finished system shall result in a water-tight installation.

1.3 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

1.4 REFERENCES

- 1. ASTM D 41, Specification for Asphalt Primer Used in Roofing, Damp-proofing, and Waterproofing
- 2. ASTM D 312, Specification for Asphalt Used in Roofing
- 3. ASTM D 451, Test Method for Sieve Analysis of Granular Mineral Surfacing for Asphalt Roofing Products
- 4. ASTM D 1079, Terminology Relating to Roofing, Waterproofing, and Bituminous Materials
- 5. ASTM D 1227, Specification for Emulsified Asphalt Used as a Protective Coating for Roofing
- 6. ASTM D 1863, Specification for Mineral Aggregate Used on Built-Up Roofs
- 7. ASTM D 2178, Specification for Asphalt Glass Felt Used in Roofing and Waterproofing

8. ASTM D 2822, Specification for Asphalt Roof Cement
9. ASTM D 2824, Specification for Aluminum-Pigmented Asphalt Roof Coating
10. ASTM D 3019, Specification for Lap Cement Used with Asphalt Roll Roofing
11. ASTM D 4601, Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing
12. ASTM D 5147, 1991 Test Method for Sampling and Testing Modified Bituminous Sheet Materials
13. ASTM E 108, Test Methods for Fire Test of Roof Coverings
14. FM, Factory Mutual
15. NRCA, National Roofing Contractors Association

1.5 PRE-APPLICATION MEETING

- A. Approximately 2 weeks before the scheduled commencement of the modified bitumen sheet roof system and associated work, meet at Project site with Installer, installer of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of rooftop units and other work in the around roofing that must precede or follow roofing work (including mechanical work if any), Architect/Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of the Work, including (where applicable) Owner's insurers, test agencies, and governing authorities. Objectives to include:
1. Review foreseeable methods and procedures related to roofing work.
 2. Tour representative areas of roofing substrates (decks), inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work performed by other trades.
 3. Review structural loading limitations of deck and inspect deck for deflections and for required attachment.
 4. Review roofing systems requirements (drawings, specifications, and other contract documents).
 5. Review required submittals, both completed and yet to be completed.
 6. Review and finalize construction schedule related to roofing work and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 7. Review required inspection, testing, certifying, and material usage accounting procedures.
 8. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not a mandatory requirement).
 9. Record discussion of the pre-application meeting, including decisions and agreements reached. Furnish a copy of this record to each party attending. If substantial disagreements exist at conclusion of conference, determine how disagreements will be resolved and set date for reconvening conference.
 10. Review notification procedures for weather or non-working days.
 11. Perform pull out test(s) with the specified fasteners, if not performed prior to the meeting, to verify the actual pull-out capacity of the fasteners, and adjust engineering calculations and fastener sizes/ layouts accordingly.

1.6 SUBMITTALS

- A. The following items shall be submitted in a letter issued by the Roof Manufacturer, along

with the roofing submittals, prior to the Roofing Pre-Installation Conference:

1. Certification by the Roofing Manufacturer that the installer is an “Approved Applicator”, in good standing, and specifically stating that the installer is both acceptable and authorized to install the proposed roofing system(s), including all required warranties.
2. Certification by the Roofing Manufacturer that the proposed system will comply with the manufacturer’s requirements, in order to qualify the project for all specified warranties and guarantee(s).
3. Certification that the Roofing Manufacturer will provide the required full 30 year, Non-Pro-rated, No Dollar Limit, Weather Tightness Warranty.

B. Product Data:

1. Manufacturer's Design Standards and other data for each item or product provided, as needed to prove compliance with specified requirements.
2. Manufacturer's installation instructions.

C. Shop Drawings:

1. The Roofing Manufacturer shall prepare Shop Drawings,
 - a. Include all typical and non-typical roof system details, including, but not limited to: details of edge conditions, joints, corners, transitions, trim, flashing, closures, penetrations, supports, anchorages, and special details related to the project.
 - b. Detail and specify locations for attachments included in the Engineering Calculations.
2. Shop Drawings shall be stamped by a Professional Engineer, licensed in the State of Louisiana.

D. Calculations:

1. The Roofing Manufacturer and/or his Engineer shall calculate the wind uplift pressures for each zone and exposure, from the specified Design Wind Speed.
2. Roofing system shall be designed in accordance with IBC-2015, and the wind uplift requirements of ASCE 7-10, for the geographical location.
3. Calculations defining wind loads on all roof areas, based on the specified Building Codes, allowable fastener loads, and required number of fasteners required to secure the roof system to the designated substructure.
4. Engineering Calculations shall be stamped by a Professional Engineer, licensed in the State of Louisiana.

E. Certifications:

1. Letter of certification from the Roofing Manufacturer that the Roofing Installer is in compliance and meets the specified requirements.
2. Letter of certification from the Roofing Manufacturer that materials provided for the project have been produced in accordance with the strictest applicable standards to ensure

- quality.
 - 3. Certified test results by a nationally recognized testing laboratory or a manufacturer's laboratory, and witnessed and certified by a professional engineer, in accordance the specified performance test methods and criteria for each product or system.
 - 4. Roofing Manufacturer's certification that materials are in compliance with the specifications.
 - 5. Manufacturer's affidavit that materials provided for, and used in the Project contains no Asbestos.
- F. Testing Reports: Showing that the roof system been tested in accordance with specified performance testing requirements.
- G. Field Reports: As prepared by the Roofing Manufacturer's Technical Field Representative, and required to ensure conformance with the warranty and Weathertightness requirements specified herein.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Manufacturer's Certificates: Signed by roofing manufacturer certifying that roofing system complies with specified performance requirements, will provide inspections, and issue the specified warranty.
- C. Sample Warranties: For manufacturer's special warranties.
- D. Class of Roofing System: Certification of Class A Roofing System.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is authorized and approved by the roofing system manufacturer to install the manufacturer's product and that is eligible to receive manufacturer's special warranty. A minimum of five (5) years of experience is required.
- B. Manufacturer Qualifications: Roofing system manufacturer shall have a minimum of 10 years of experience in manufacturing modified bitumen roofing products in the United States and be ISO 9001 certified.
- C. Roofing products or methods to be considered must have a minimum of ten (10) years successful performance in roofing and re-roofing applications.
- D. It is the intent of this specification to provide a roof system with an ASTM E 108 Class A fire rating.
- E. Installer's Field Supervision: The roofing system installer is required to maintain a full-time Superintendent on the job site during all phases of modified bituminous sheet roofing work and at any time roofing work is in progress. Proper supervision of workmen

shall be maintained. A copy of the specification shall be in the possession of the Supervisor/Foremen and on the roof at all times.

- F. It shall be the Contractor's responsibility to respond immediately to correction of roof leakage during construction.

1.10 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 and handle roofing sheets in a dry, well-ventilated, weather-tight place to ensure no possibility of significant moisture exposure. Store rolls of felt and other sheet materials on pallets or other raised surface. Stand all roll materials on end and cover these materials with a canvas tarpaulin or other breathable material (not polyethylene).
- C. 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.
- D. 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.
- E. Do not leave unused rolled goods on the roof overnight or when roofing work is not in progress. These items must be stored as mentioned above.
- F. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.11 FIELD 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. Weather Condition Limitations: Do not apply roofing membrane during inclement weather or remove roofing when a 40% chance of precipitation is expected.
- C. Do not apply roofing insulation or membrane to damp deck surface.
- D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.
- E. Proceed with roofing work only when existing and forecasted weather conditions will

permit unit of work to be installed in accordance with manufacturer's recommendations and warranty requirements.

1.12 INSPECTIONS AND TESTS

- A. The Architect, Owner's Representative, Project Manager and Roofing Manufacturer's Technical Field Representative shall at all times have access to the job site and work areas.
- B. The Contractor shall provide proper and safe facilities for such access and inspection, in accordance with applicable Federal, State, and Local laws and regulations.

C. Inspections.

1. The Architect, Owner's Representative, and/or Project Manager's Inspections:

- a. The Architect, Owner's Representative, and/or Project Manager will perform periodic inspections throughout the duration of the project.
- b. The Architect, Owner's Representative, and/or Project Manager shall inspect the work after the completion of each major phase of construction.

2. Manufacturer's Inspections:

- a. An Authorized Technical Field Representative of the Roofing Material Manufacturer shall make a site visit and inspection, no less than three (3) times each week, for the duration of the performance of Work, to ensure that the installation is installed in strict accordance with the Roofing Manufacturer's requirements, the Contract Documents, the Project Specifications, the approved Shop Drawings and Engineering Data, and the Roofing Manufacturer's standard details.
- b. A written report of each site visit and inspection, consisting of photos and written documentation, shall be prepared by the Roofing Manufacturer's Authorized Technical Field Representative, and shall be forwarded over to the Architect, the Owner's Representative, and/or the Project Manager on each Monday following the prior week.
- c. The Roofing Manufacturer's Authorized Technical Field Representative shall be responsible for:
 - 1. Keeping the Architect, the Owner's Representative, and/or the Project Manager informed after periodic inspections as to the progress and quality of the work observed.
 - 2. Calling to the attention of the Contractor those matters observed which are considered to be in violation of the Contract requirements.
 - 3. Reporting to the Architect, the Owner's Representative, and/or the Project Manager, in writing, of any failure or refusal of the Contractor to correct unacceptable practices called to his attention.
 - 4. Confirming, after completion of the work, and based on his observations and tests, that he has observed no application procedures, or other issues in conflict with the Roofing Manufacturer's requirements, the Contract Documents, the Project Specifications, the approved Shop Drawings and Engineering Data, and/or the Roofing Manufacturer's standard details.

D. Any failure by the Architect, the Owner's Representative, the Project Manager, or the roofing

manufacturer's Technical Field Representative to observe, detect, pinpoint, or object to any defect or noncompliance with the requirements of the Roofing Manufacturer's requirements, the Contract Documents, the Project Specifications, the approved Shop Drawings and Engineering Data, and/or the Roofing Manufacturer's standard details – of work in progress or completed work – shall not relieve the Contractor of, or reduce, or in any way limit, his responsibility of full performance of the work required of him under the requirements of the Roofing Manufacturer, the Contract Documents, the Project Specifications, the approved Shop Drawings and Engineering Data, and/or the Roofing Manufacturer's standard details.

- E. The Architect, the Owner's Representative, an/or the Project Manager, on behalf of the Owner, may require tests and inspections as necessary to verify the quality of the roofing materials and/or workmanship of installation.
1. The Owner shall select the Testing Laboratory and shall pay for all costs associated with initial testing.
 2. The costs for any initial tests meeting the applicable requirements shall remain the responsibility of the Owner.
 3. The costs for any initial tests not meeting the applicable requirements shall become the responsibility of the Contractor, and shall be deducted by the Owner from the Contractor's payment for the work.
 4. The costs for re-testing of any work not meeting the applicable requirements shall be the responsibility of the Contractor, and shall be deducted by the Owner from the Contractor's payment for the work.
 5. Subsequent non-compliance with applicable requirements will result in the Owner assigning a full time, Third-Party Quality Control Representative to the project. The costs for the Third-Party Quality Control Representative shall be the responsibility of the Contractor, and shall be deducted by the Owner from the Contractor's payment for the work.
 6. Laboratory tests shall be performed in accordance with the applicable ASTM standard testing procedures.

1.13 SEQUENCING AND SCHEDULING

- A. Sequence installation of modified bituminous sheet roofing with related units of work specified in other sections to ensure that roof assemblies, including roof accessories, flashing, trim, and joint sealers, are protected against damage from effects of weather, corrosion, and adjacent construction activity.
- B. All work must be fully completed on each day. Phased construction will not be accepted. Begin and apply as much roofing in one day as can be completed that same day.

1.14 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of the roofing system that fail in materials, workmanship, and aesthetics within specified warranty period.
1. Warranty Period: Thirty (30) Year, "No Dollar Limit" "Edge to Edge" Warranty from date of Substantial Completion.

- B. Contractor Warranty: Submit roofing Installer's warranty, signed by Installer, covering the Work of this Section, including all components of roofing system such as membrane roofing, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, and walkway products, for the following warranty period:
 - 1. Warranty Period: Two years from date of Substantial Completion.
- C. Annual Inspections: Membrane manufacturer will provide, free of charge, at the annual request of the Owner, annual inspections for the life of the warranty.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Description: fully-adhered 2-ply SBS modified bitumen system suitable for application method required, cap sheet to be mineral granule surface with UL Class A and FM I-90 wind uplift criteria, as required to meet the wind speed requirements of IBC-2015 and ASCE 7-10 (specified herein, above).
- B. Approved manufacturers are as listed below:
 - 1. The Garland Company, Inc.
 - 2. Prior-approved equal.
- C. Source Limitations: Obtain components for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed 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. Roofing and base flashings shall remain watertight.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
- C. Roofing System Design: The roofing system shall resist the following uplift pressures based upon the following:
 - 1. Wind Speed: 142mph.
 - 2. Occupancy Category: II.
 - 3. Importance Factor: 1.0.
 - 4. Exposure Category: B.
 - 5. Height: 30 feet.
- D. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A. Identify products

with appropriate markings of applicable testing agency.

2.3 ROOFING SHEET MATERIALS

- A. Base Ply: ASTM D 5147, Grade S, 110 mil minimum thickness, SBS- modified asphalt sheet (reinforced with glass fibers); smooth surfaced; heat fusible; suitable for application method specified. HPR Torch Base by The Garland Company, Inc. or prior-approved equal.
- B. Top Ply: ASTM D 6162, Grade G, Type III, 135 mil minimum thickness; SBS-modified asphalt sheet (reinforced with glass fibers; white granule surfaced; heat fusible; suitable for application method specified. Stressply IV Plus Mineral by The Garland Company, Inc. or prior-approved equal.

2.4 BASE FLASHING SHEET MATERIALS

- A. Base Ply Sheet: ASTM D 5147, Grade S, 90 mil minimum thickness, SBS-modified asphalt sheet (reinforced with glass fibers); smooth surfaced; heat fusible; suitable for application method specified.
- B. Granule-Surfaced Flashing Sheet: ASTM D 6162, Grade G, Type III, 135 mil minimum thickness; SBS-modified asphalt sheet (reinforced with glass fibers; white granule surfaced; heat fusible; suitable for application method specified.

2.5 AUXILIARY ROOFING MATERIALS

- A. Roof Coating: Non-Fibered Aluminum Coating, GarlaBrite by The Garland Company, Inc. or pre-approved equal.
- B. Asphalt Primer: ASTM D 41.
- C. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing system manufacturer for application.
- D. Quick Setting Grout: Pitch pocket base filler as provided by prime material supplier.
- E. Mastic Sealant: Polyisobutylene, plain or modified bitumen; non-hardening, non-migrating, non-skinning, and nondrying.
- F. Nails and Fasteners: Non-ferrous metal or galvanized steel, except that hard copper nails shall be used with copper; aluminum or stainless steel nails shall be used with aluminum; and stainless steel nails shall be used with stainless steel. Nails and fasteners shall be flush-driven through flat metal discs of not less than 1-inch diameter. Metal discs may be omitted when one piece composite nails or fasteners with heads not less than 1-inch diameter are used. Fasteners shall be designed for fastening roofing components to substrate; tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.
- G. Roofing Granules: Ceramic-coated roofing granules, No. 11 screen size with 100 percent

passing No. 8 sieve and 98 percent of mass retained on No. 40 sieve, color to match roofing.

- H. Miscellaneous Accessories: Provide those recommended by roofing system manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:
1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies 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 surface plane flatness and fastening of steel roof deck complies with requirements specified in the appropriated steel deck specifications.
 4. 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.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.3 INSTALLATION, GENERAL

- A. Comply with roofing system manufacturer's written instructions.
- B. Substrate-Joint Penetrations: Prevent adhesives from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

3.4 ROOFING INSTALLATION, GENERAL

- A. Start installation of roofing in presence of manufacturer's technical personnel.
- B. Cooperate with manufacturer, inspection and test agencies engaged or required to perform services in connection with installing modified bitumen sheet system.
- C. If applicable, where roof slope exceeds 3/4 inch per 12 inches, install roofing membrane sheets parallel with slope.

1. Back nail roofing sheets to substrate according to roofing system manufacturer's written instructions.
- D. Coordinate installation of roofing system so insulation and other components of the roofing system 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 roofing sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt, with joints and edges sealed.
 2. Complete terminations and base flashings, and provide temporary seals to prevent water from entering completed sections of roofing system.
 3. Remove and discard temporary seals before beginning work on adjoining roofing.

3.5 MECHANICAL COORDINATION

- A. Roof top mounted equipment shall be mounted level.
1. Provide curbs with sloped bases, as required to match the roof deck or structural framing slope. Where roof structure is level, provide level base curbs.
 2. Provide curbs with level tops, to allow equipment to be installed level.
 3. Provide curb types & heights as required to achieve required minimum base flashing criteria.
 4. Unless noted otherwise, curbs shall be fabricated from galvanized steel.
 5. Unless specifically noted otherwise, provide insulated curbs.
- B. Gas Equipment heights as required to achieve minimum 3" vertical clearance between roof surface and bottom of drip leg piping cap.
- C. For safety, ease of maintenance, and to minimize damage to roof system components, no equipment located within 5 feet of roof expansion joints and/or roof divider joints, vertical parapets; no equipment within 10 feet of roof edges.
- D. Roof system thermal insulation values based on HVAC system design.
- E. Coordinate the removal or relocation of mechanical equipment with the Owner's Representative, and/or Project Manager.
- F. Where roofing work involves removal, relocation, or replacement of existing mechanical equipment, coordinate and phase work to maintain climate control on building at all times.

3.6 BASE-PLY SHEET INSTALLATION

- A. Heat Fused Base: Install one layer of SBS heat fused base sheet to a properly prepared insulation or roof deck board.
1. Shingle in proper direction to shed water on each area of roofing.
 2. To a suitable substrate, lay out the roll in the course to be followed and unroll six (6) feet.

3. Using a roofing torch, heat the surface of the coiled portion until the burn-off backer melts away. At this point, the material is hot enough to lay into the substrate. Progressively unroll the sheet while heating and press down with your foot to insure a proper bond.
4. After the major portion of the roll is bonded, re-roll the first six (6) feet and bond it in a similar fashion.
5. Repeat this operation with subsequent rolls with side laps of four (4) inches and end laps of eight inches.
6. Give each lap a finishing touch by passing the torch along the joint and spreading the melted bitumen evenly with a rounded trowel to insure a smooth, tight seal.
7. Extend underlayment two (2) inches beyond top edges of cants at wall and projection bases. Install base flashing ply to all perimeter and projections details.

3.7 MISCELLANEOUS ROOFING COMPONENTS

A. Metal Edge (Shop Fabricated, ANSI/SPRI ES-1):

1. Inspect the wood nailer to assure proper attachment and configuration.
2. Run base ply over to the outside of blocking.
3. Install metal cleat and fasten as called for.
4. Prime metal edge at a rate of one hundred (100) square feet per gallon and allow surface to dry.
5. Mechanically attach metal flashing at 3" c/c staggered.
6. Strip in flange with base flashing ply covering entire flange in bitumen with six (6) inches on to the field of roof. Assure ply laps do not coincide with metal laps.
7. Install a second ply of modified flashing ply over the base flashing ply, nine (9) inches onto the field of the roof.
8. Install cover plates as detailed.

B. Expansion Joint:

1. Install new treated wood blocking.
2. Run base ply over to the expansion area. Cut prior to installing expansion joint.
3. Prime metal edge at a rate of one hundred (100) square feet per gallon and allow for drying.
4. Strip in flange with base flashing ply covering entire flange in bitumen with six (6) inches on to the field of roof. Assure ply laps do not coincide with metal laps.
5. Install a second ply of modified flashing ply over the base flashing ply, nine (9) inches on to the field of the roof.

C. Roof Drains:

1. Plug drain to prevent debris from entering plumbing.
2. Taper insulation to drain minimum of twenty four (24) inches from center of drain.
3. Run base ply over drain. Cut out plies inside drain bowl.
4. Set lead flashing (thirty (30) inch square minimum) in ¼ inch bed of mastic. Run lead/copper into drain a minimum of two (2) inches. Prime lead/copper at a rate of one hundred (100) square feet per gallon and allow for drying.
5. Install stripping ply forty (40) inches square minimum.
6. Install modified membrane (forty-eight (48) inches square minimum).
7. Install clamping ring and assure that only the base ply, lead and stripping

- membrane are under the clamping ring.
- 8. Remove drain plug and install strainer.
- 9. Provide pitch damns at all drains where aggregate surfacing is being installed.

D. Curb Type Penetrations:

- 1. Minimum curb height is eight (8) inches. Prime vertical at a rate of 100 square feet per gallon and allow for drying
- 2. Set cant in insulation adhesive. Run base ply over cant a minimum of two (2) inches.
- 3. Install base flashing ply covering curb set in bitumen with six (6) inches on to field of the roof.
- 4. Install a top ply of modified flashing over the base flashing ply, nine (9) inches on to the field of the roof. Attach top of membrane to top of curb and nail at eight (8) inches c/c. Apply a three-course application of mastic and mesh at all vertical seams and allow application to cure prior to coating.
- 5. Install pre-manufactured cover. Fasten sides at 24 inches c/c with fasteners and neoprene washers. Furnish all joint cover laps with butyl tape between metal covers.
- 6. Set equipment on neoprene pad and fasten as required by equipment manufacturer.

E. Plumbing Vent:

- 1. Minimum vent height shall be eight (8) inches.
- 2. Run roof system over the entire surface of the roof. Seal the base of the stack with elastomeric sealant.
- 3. Prime flange of new sleeve. Install properly sized sleeves set in ¼ inch bed of roof cement.
- 4. Install base flashing ply by torch.
- 5. Install membrane by torch.
- 6. Caulk the intersection of the membrane with elastomeric sealant.
- 7. Turn sleeve a minimum of one (1) inch down inside of stack.

F. Flange Type Vents:

- 1. New vents shall match existing size and profile.
- 2. Run roof system over the entire surface of the roof. Seal the base of the stack with elastomeric sealant.
- 3. Prime flange of new vent and set in ¼ inch bed of elastomeric roof cement.
- 4. Install base flashing ply by torch.
- 5. Install membrane by torch.
- 6. Caulk the intersection of the membrane with elastomeric sealant.

G. Flashing At Wall:

- 1. Minimum flashing height is 8". Install insulation and roof deck board as detailed.
- 2. Set cant in bitumen. Run all roofing plies over cant a minimum of 2".
- 3. Prepare all walls and penetrations to be flashed with asphalt primer at the rate of ½ gallon per square.
- 4. Heat fuse bottom ply of flashing membrane.
- 5. The heat fused flashing membrane will be adhered to an underlying base ply of glass felt bonded in asphalt when torching near wood nailers or combustible

surfaces.

6. After the laps have been tested, and a complete positive bond has been achieved, the applicator shall heat the seam edge and trowel along the seam edge. Troweling shall continue until a sloped, beveled edge has been produced.
7. Heat fuse top ply of flashing membrane.
8. After the laps have been tested, and a complete positive bond has been achieved, the applicator shall heat the seam edge and trowel along the seam edge. Troweling shall continue until a sloped, beveled edge has been produced.
9. Install a termination bar at the top of all base flashing. The termination bar shall be mechanically attached every 8" on center. Apply a three course application of mastic and reinforcing mesh over the term bar and onto the wall.
10. All vertical laps in base flashing system shall receive a reinforcement of flashing cement / mesh / flashing cement.

3.8 SBS-MODIFIED BITUMINOUS MEMBRANE INSTALLATION

A. Heat Fused or Torch Applied:

1. Over the SBS torch base sheet underlayment, lay out the roll in the course to be followed and unroll six (6) feet. Seams for the top layer of modified membrane will be staggered over the SBS torch base sheet seams.
2. Using a roofing torch, heat the surface of the coiled portion until the burn-off backer melts away. At this point, the material is hot enough to lay into the substrate. Progressively unroll the sheet while heating and press down with your foot to insure a proper bond.
3. After the major portion of the roll is bonded, re-roll the first six (6) feet and bond it in a similar fashion.
4. Repeat this operation with subsequent rolls with side laps of four (4) inches and end laps of eight (8) inches.
5. Give each lap a finishing touch by passing the torch along the joint and spreading the melted bitumen evenly with a rounded trowel to insure a smooth, tight seal.

B. Laps: Accurately align roofing sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.

1. Repair tears and voids in laps and lapped seams not completely sealed.
2. Apply roofing granules to cover exuded bead at laps while bead is hot.

C. Install roofing sheets so side and end laps shed water.

3.9 FLASHING AND STRIPPING INSTALLATION

A. Install base flashing over cant strips and other sloped and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:

1. Prime substrates with asphalt primer if required by roofing system manufacturer.
2. Flashing-Sheet Application: Torch apply flashing sheet to substrate.

B. Extend base flashing up walls or parapets a minimum of 8 inches above roofing membrane and 6 inches onto field of roofing membrane.

- C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
 - 1. Install a termination bar at the top of all base flashing. The termination bar shall be mechanically attached every 8" on center. Apply a three course application of mastic and reinforcing mesh over the term bar and onto the wall.
 - 2. All vertical laps in base flashing system shall receive a 6 inch wide heat fused reinforcing ply of mineral surfaced base flashing.
- D. Install roofing cap-sheet stripping where metal flanges and edgings are set on roofing according to roofing system manufacturer's written instructions.

3.10 SURFACING

A. Bleed Out:

- 1. Immediately broadcast new clean minerals into the bleed out of the modified roof membrane.
- 2. The overall appearance of the finished roofing application is a standard requirement for this project. The Roofing Contractor shall make necessary preparations, utilize recommended application techniques (i.e. to immediately apply the specified granules into the bleed out) to ensure that the finished application is acceptable to the Owner. The Architect and Owner will be the sole judge as to whether the finished surface is acceptable.

B. Roof Coating:

- 1. After a final inspection has been performed and all items have been corrected on the punch list, Contractor shall apply specified coating.
- 2. Apply two applications of the specified coating at rate of 3/4 gallons per square per coat. First pass shall be North and South. Second pass shall be East and West.

3.11 FIELD QUALITY CONTROL

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
 - 1. Notify Architect and Owner 48 hours in advance of date and time of inspection.
 - 2. Walk roof surface areas of the building, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each party.
 - 3. The Architect reserves the right to request a thermographic scan of the roof during final inspection to determine if any damp or wet materials have been installed. The thermographic scan shall be provided for the Owner by the Roofing Material Manufacturer at a negotiated price.
 - 4. If water and/or moisture is discovered beneath the cap and/or base sheets as a result of improper installation, all membranes must be removed and replaced with new at no additional cost to the Owner. This includes any damaged roof deck board and/or insulation boards.
 - a. If the deck system has sustained damage as a result of water and/or moisture as a result of improper installation. The Contractor must replace and/or make

- repairs to the deck at no additional cost to the Owner.
- b. Conduct proper sequencing to eliminate water and moisture prior to reinstallation.
- 5. If core cuts verify the presence of damp or wet materials, the Roofing Contractor shall be required to replace the damaged areas at his own expense and reimburse the Owner for the cost of the scan.
- 6. Replace deteriorated or defective work found during inspections to a condition free of damage and deterioration at time of Substantial Completion.
- 7. The SBS roofing membranes (including the cap sheet) must be free from, but not limited to, ripples, fish mouths, blisters, air pockets, bubbles, etc. The surface must be smooth, flat, and aesthetically pleasing for a finished appearance. The cap sheet surface must be free from, but not limited to, adhesives, mastics, smears, foot tracks of substances, and any other substance that will detract from and cause an unpleasing and unacceptable aesthetic appearance.
 - a. The SBS roofing membrane system will not be accepted if these type conditions are experienced.
- 8. The Contractor is to notify the Architect upon completion of corrections.
- 9. Following the final inspection, acceptance will be made in writing by the material manufacturer.

3.12 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does 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. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 55 00

SECTION 07 60 00 - FLASHING AND SHEET METAL

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, but not limited to:
 - 1. Formed low-slope roof flashing and trim.
 - 2. Formed counter flashing and trim.
 - 3. Miscellaneous Sheet Metal Items.

1.3 RELATED SECTIONS

- 1. Division 07 Section "Roof and Deck Insulation."
- 3. Division 07 Section "SBS Modified Bitumen Roof Membrane"

1.4 REFERENCES

- 1. ASTM A-446 Specification for Steel Sheet.
- 2. ASTM B-209 Specification for Aluminum Sheet.
- 3. ASTM B-221 Specification for Aluminum Extruded Shape.
- 4. FS QQ-L-201 Specification for Lead Sheet.
- 5. ASTM A792 Steel Sheet, Aluminum-Zinc Alloy-Coated, by the Hot-Dip Process.
- 6. ASTM B32 Solder Metal.
- 7. ASTM B209 Aluminum and Alloy Sheet and Plate.
- 8. ASTM B486 Paste Solder.
- 9. ASTM D226 Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
- 10. ASTM D486 Asphalt Roof Cement, Asbestos-free.
- 11. FS O-F-50 Flux, Soldering, Paste and Liquid.
- 12. WH Warnock Hersey International, Inc. Middleton, WI.
- 13. NRCA National Roofing Contractors Association - Roofing Manual.
- 14. SMACNA Architectural Sheet Metal Manual.

1.5 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leak-proof, secure, and noncorrosive installation.

1.6 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.

1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and items of other construction that affect sheet metal flashing and trim.
3. Review requirements for insurance and certificates if applicable.
4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.7 ACTION SUBMITTALS

- A. Product Data: For each type of product, including hoods, vents, edge metal, fascia, and all other sheet metal fabrications.
 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
 2. Indicate type, gauge, and finish of metal.
- B. Shop drawings: For sheet metal flashing and trim, indicate material profiles, metal type, metal gauge, metal finish, dimensions, jointing pattern, jointing details, fastening methods, flashing, terminations, and installation details.
- C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.
- D. Samples for Verification: For each type of exposed finish.
 1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
 2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.

1.8 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Product Certificates: For each type of coping and roof edge flashing that is ANSI/SPRI ES-1 tested.
- C. Roofing System Manufacturer's Certification: Metal edge systems and other miscellaneous metals furnished are acceptable to roofing manufacturer as a component of roofing system and are included in the manufacturer's roof system warranty.

1.9 QUALITY ASSURANCE

- A. Reference Standards:
 1. Comply with details and recommendations of SMACNA Architectural Sheet Metal Manual for workmanship, methods of joining, anchorage, provisions for expansion, etc. Conform to dimensions and profiles shown unless more stringent requirements are indicated.
 2. ASCE 7-16.
 3. IBC 2021.

B. In Field Mockups:

1. The Contractor shall provide and install 10 feet long sample mockups for each different condition as follows: edge metal, fascia, coping, and gutter. The mockups shall be fabricated from the same material scheduled and specified to be used throughout. The Contractor shall allow for any dimensional, shape, or profile adjustment to the satisfaction and approval of the Architect.

C. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance a minimum of 5 years.

1. For roof edge flashings that are fabricated in accordance with ANSI/SPRI ES-1 requirements, shop shall be listed as able to fabricate required details as tested and approved.

1.10 CONTRACTOR'S WARRANTY

- A. The Contractor shall provide the Owner with a notarized written warranty assuring that all sheet metal work including caulking and fasteners to be watertight and secure for a period of two years from the date of final acceptance of the building. Warranty shall include all materials and workmanship required to repair any leaks that develop, and make good any damage to other work or equipment caused by such leaks or the repairs thereof.

1.11 SBS ROOFING SYSTEM MANUFACTURER'S OBSERVATIONS

- A. Refer to Specification "SBS Modified Bitumen Membrane Roofing" for observation specifics and requirements.

1.12 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

3. This warranty shall be included with the SBS roofing manufacturer's system warranty.

- B. Edge Metal Leak-Tight Warranty: Edge metal fabricator and installer agrees to make repairs or replace the edge metal due to failure within the specified warranty period.

1. Leak-Tight Warranty Period: 30 years from date of Substantial Completion.

2. This warranty shall be included with the SBS roofing system manufacturer's system warranty.

1.13 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original, unopened containers or packages with labels intact and legible.
- B. Stack performed and pre-finished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials which may cause discoloration or staining.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. ANSI/SPRI ES-1 Wind Design Standard: Fabricate and install roof edge flashings that are fabricated according to ANSI/SPRI ES-1 standards and capable of resisting the following design pressures:
 1. Wind Pressure: 140 mph.
 2. Occupancy Category: III.
 3. Importance Factor: 1.15.
 4. Exposure Category: B.
 5. Building Height: 18 feet.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects.
- E. Sheet metal shall be supplied by the Prime Roofing Material Manufacturer, and shall be included in the Specified Warranties.

2.2 MATERIALS AND GAUGES

- A. Stainless Steel Sheet: ASTM A 67; commercial quality, 2D annealed finish, 304 stainless steel, 24 gauge.

- B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275); structural quality with manufacturer's standard clear acrylic coating both sides.
- C. Pre-painted, Metallic-Coated Steel Sheet: Steel sheet metallic coated by the hot-dip process and pre-painted 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 (Z275) coating designation; structural quality.
 - 2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275); structural quality.
 - 3. Exposed Finishes: Apply the following coil coating:
 - a. Factory Prime Coating: Factory-applied, baked-on epoxy primer coat.
 - b. Two-Coat Fluoropolymer Coating: Thermocured system containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2604, except as modified for below:
 - 1) Humidity Resistance: 2000 hours
 - 2) Salt Spray Resistance: 1000 hours.
 - 3) Color: As selected from the manufacturer's full range of colors.

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.
- B. Fasteners: Self tapping screws, bolts, nuts, self locking rivets and bolts, end welded studs, Wood screws, annular threaded nails, self-tapping screws, self- locking rivets and bolts, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of materials being fastened by means of factory applied coating.
 - 1. All Fasteners: All fasteners shall match the adjacent panel or trim finish and color, as specified and selected.
- C. Elastomeric Sealant: ASTM C 920, elastomeric non-skinning polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- D. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.
- E. Zinc Flashings (Plumbing Vents and Roof Drain Pans): ASTM B69-98a, 99.995% pure zinc. Thickness: 0.03"

2.5 NAILS, RIVETS, AND FASTENERS

- A. Nails: Copper, Stainless Steel or Galvanized depending on application.

- B. Rivets: Copper, Aluminum, or Stainless Steel depending on application.
- C. Exposed Fasteners and Washers: Stainless Steel Screws with covered neoprene gaskets.
- D. Unexposed Fasteners and Washers: Stainless steel.

2.6 RELATED MATERIALS

- A. Flux: Raw Muriatic Acid killed with Zinc Chloride.
- B. Solder: Conform to current ASTM B-12. 50% tin and 50% lead.
- C. Burning Rod for Lead: Same composition as lead sheet.
- D. Joint Sealant: Polyurethane, see Joint Sealant Section.
- E. Underlayment: Vinyl Membrane.

2.7 ROOF AND WALL SHEET METAL FABRICATIONS

- A. Metal Edge, Gutter, Downspouts: Fabricate from the following material:
 - 1. Pre-painted, Metallic-Coated Steel: 22 gauge.
- B. Gutter Bracket:
 - 1. 1/8"(thick) x 1" hot dipped galvanized flat stock for gutter brackets shall extend up the entire back height of the gutter and be attached with a minimum of two 8"x2" wood grip screws. The brackets will be installed in 36" centers and match profile of new gutter. Brackets shall be wrapped with same prefinished metal as gutters.
- C. Gutter Spacer:
 - 1. ASTM A67 ; commercial quality, 2D annealed finish, 304 stainless steel, 16 gauge x 1" wide. Spaced at 36" on centers alternating between gutter and brackets.
- D. Expansion Joint Cover, Counterflashing and Flashing Receivers: Fabricate from the following material:
 - 1. Pre-painted, Metallic-Coated Steel: 22 gauge.
- E. Metal Fascia: Fabricate from the following material:
 - 1. Pre-painted, Metallic-Coated Steel: 22 gauge.
- F. Vents, Pitch Pans, Pipe Hoods
 - 1. 304 SS all joints soldered. 24 gauge.
- G. Continuous Cleat:
 - 1. Galvanized 20 gauge.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify all existing work is complete to a point where this installation may commence.
- B. In the event of discrepancy, notify Architect. Do not proceed until discrepancies have been resolved.
- C. Sheet metal items scheduled for replacement shall be field measured prior to fabrication. Sizes shall match existing.
- D. Field measure site conditions prior to fabricating work.

3.2 FABRICATION

- A. Shop fabricate work to greatest extent possible. Comply with details shown, and with applicable requirements of NRCA, SMACNA, and other industry practices.
- B. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work, sufficient to permanently prevent leakage, damage or deterioration of work.
- C. Form exposed sheet metal work without excessive oil-canning, buckling and tool marks, true to line and levels as indicated, with exposed edges folded back to form hems.

3.3 LEAD FLASHING INSTALLATION

- A. Set all leads in a bed of asphalt mastic. Prime both sides of lead flashing.
- B. At pipe vents, turn lead down into pipe opening and crimp.

3.4 CLEATS

- A. Provide continuous cleats for all edge metal, with the profiles indicated and where shown on the contract drawings to secure loose edges of sheet metal work.
- B. Space butt joints approximately 1/8" apart.
- C. Fasten cleats to the supporting construction with stainless steel fasteners evenly spaced to resist pressures as set forth herein, but in no case, greater than 12" on center. Fasten to concrete or masonry with screws driven in expansion shields set in concrete or masonry. Cleat should be fabricated to a size to ensure a rigid installation.

3.5 CLEANING

- A. Clean exposed metal surface removing substances which might cause corrosion of metal or deterioration of finish.
- B. Remove protective plastic sheeting from metal surfaces.

SECTION 07 62 50 - ROOF EDGE AND VENTILATION SYSTEMS

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Metal Fascia.
- B. Metal Coping.
- C. Metal Drip Edge.
- D. Metal Coping Cap.
- E. Vented and Non-Vented Eave and Fascia.
- F. Ridge Vent.
- G. Accessories.

1.2 RELATED SECTIONS

- A. Section 06 16 00 - Sheathing: Plywood and oriented strand board.
- B. Section 07 22 00 - Roof and Deck Insulation: Roof board insulation.
- C. Section 07 41 13.16 – Standing-Seam Metal Roof Panels.
- D. Section 07 41 13.13 – Formed Metal Wall Panels
- E. Section 07 55 00 – Modified Bitumen Membrane Roofing
- F. Section 07 60 00 - Sheet Metal Flashing and Trim.

1.3 REFERENCES

- A. ANSI/SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.
- B. Factory Mutual Research Corporation Approval Guide.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- 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. Shop Drawings: Show profiles, joining method, location of accessory items, anchorage and flashing details, adjacent construction interface, and dimensions.
- D. Verification Samples: For each finish product specified, two sample chips representing actual product, color, and patterns.
- E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this section with minimum twenty five years documented experience.
- B. Installer Qualifications: Company specializing in the installation of products specified in this section with minimum five years documented experience.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved

by Architect.

3. Refinish mock-up area as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store materials in a dry, protected, well-vented area.
- C. Remove protective plastic surface film immediately before 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.

1.7 SEQUENCING

- A. Ensure that information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.
- B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.
- C. Coordinate installation with roof membrane manufacturer's installation instructions.

1.8 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.

1.9 WARRANTY

- A. Provide the manufacturer's warranty specified under products for the roof edge system, when installed per manufacturer's instructions. Warranty will not exceed the life of the roof membrane on which the product was originally installed.
- B. Provide a 30 year warranty for manufacturer approved PAC-CLAD 70 percent Kynar colors for the painted finish covering color fade, chalk, and film integrity.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Petersen Aluminum Corp., contact – Tony Sauve, tsauve@petersenmail.com, Phone: 969-205-3531
- B. MBCI, contact – Alan Thompson, alan.thompson@cornerstone-bb.com, Phone: 920-342-4235

2.2 COPING PRODUCTS

- A. PAC-TITE Gold Coping
 1. Construction:
 - a. 24 gauge galvanized steel.
 - b. Finish:
 - 1) Kynar-500
 - a) PAC-CLAD, Color A – Granite, Color B – Slate Gray.
 - b) MBCI, Color A – Ash Gray, Color B – Slate Gray.
 - c. Construction:
 - 1) Coping cap: Length of 12 feet 0 inches (3.65 m), widths to 30 inch (762 mm) manufactured to job requirements.

- 2) Coping vertical face and back leg: 2-3/4 inch to 12 inch (69.85 mm to 304.8 mm) manufactured to job requirements.
- 3) Concealed splice plates: 8 inch (203 mm) wide. Finish to match finish of coping cap with factory applied dual non-curing sealant strips.
- 4) Anchor/Support Cleat: 16 gauge pre-punched galvanized cleat with stainless steel spring mechanically locked to cleat normally 12 inch (305 mm) wide at 3 foot 0 inch (.9144 m) on center. Mechanically fastened as indicated and detailed.
- d. Fasteners: 1-1/2 inch (38 mm) Stainless Steel with driver.
- e. Performance:
 - 1) Lifetime, 215 mph Wind Warranty
 - 2) Tested per ANSI/SPRI/FM 4435 ES-1 Standard to comply with the International Building Code.

2.3 ACCESSORIES

- A. Miters and end caps shall be welded pre-finished units by manufacturer to suit the conditions indicated on the Drawings.
- B. Provide fasteners consistent with manufacturer's instructions for each product that is suitable for the substrate to which it is being installed.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify that the substrate is dry, clean and free of foreign matter.
- C. If substrate 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.
- C. Verify the manufacturer's roof edge details for accuracy to fit the assembly prior to fabrication.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's installation instructions.
- B. Use provided fasteners consistent with manufacturer's instructions, suitable for the substrate to which it is being installed.
- C. Install water cut-off, as recommended by the membrane manufacturer, under the anchor bar.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 07 62 00

Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

BXUV – Fire Resistance Ratings – ANSI/UL 263 Certified for United States

BXUV7 – Fire Resistance Ratings – CAN/ULC-S101 Certified for Canada

[See General Information for Fire-resistance Ratings – ANSI/UL 263 Certified for United States Design Criteria and Allowable Variances](#)

[See General Information for Fire Resistance Ratings – CAN/ULC-S101 Certified for Canada Design Criteria and Allowable Variances](#)

Design No. **I504**

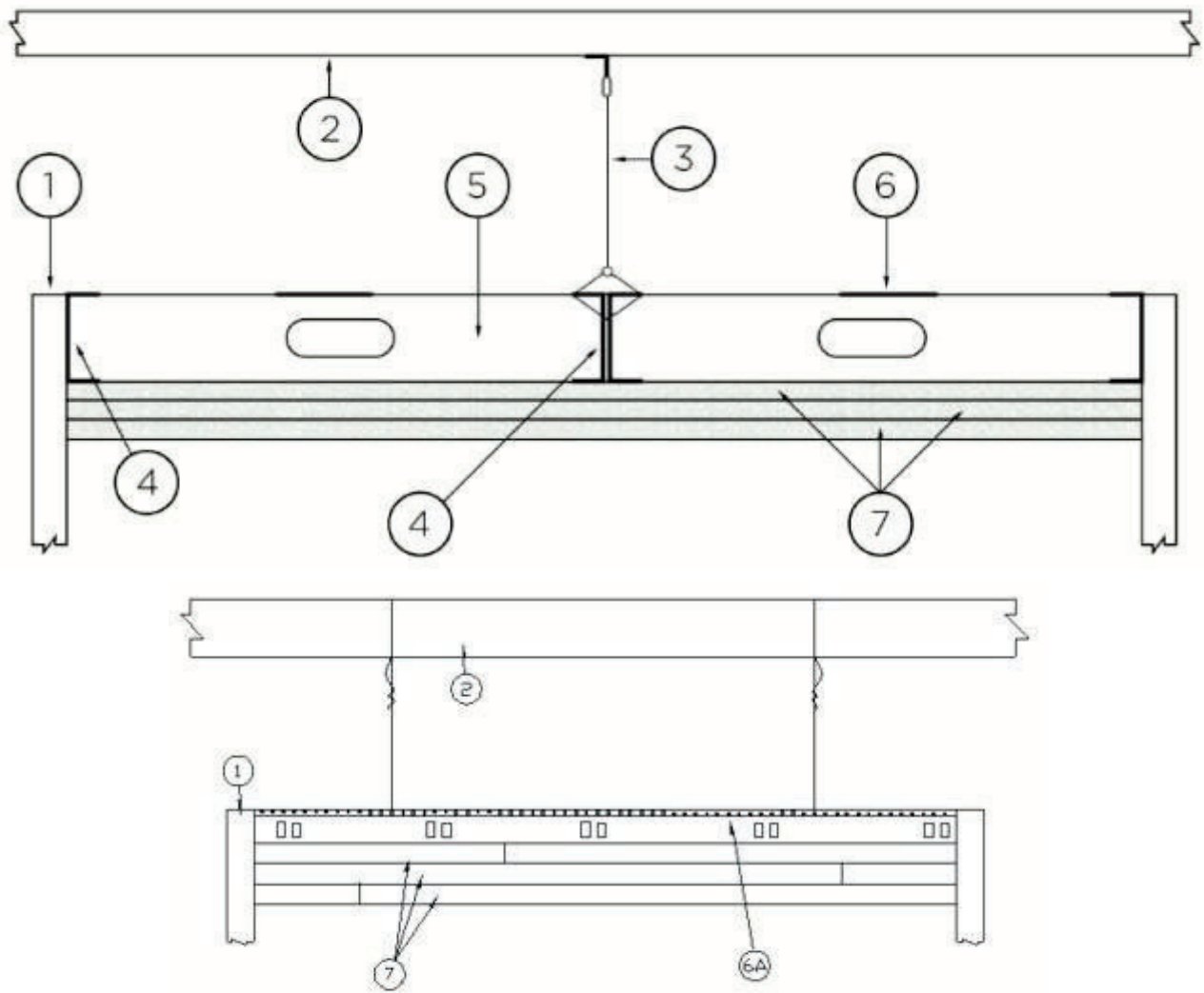
June 13, 2024

Ceiling Membrane Rating – 1 Hr.

Load Restriction – Limited to the Dead Weight of the Assembly

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

1 Hour System



1. **Supporting Structure #1** — Fire-resistance rated. Suitable point of attachment of C-Channels (Item 4).

2. **Supporting Structure #2** — If necessary - Suitable point of attachment of hanger wire (Item 3).

3. **Hanger Wire** — If necessary - Min. 8 gauge steel wire, hung from holes punched in C-Channel (Item 4). Hanger wire spaced nominally 24 in. OC.

4. **C-Channels** — Used to support steel studs at both ends. Min. 3-5/8 in. deep with min. 1-1/4 in. legs and formed from min. No. 20 MSG galv. steel. Perimeter channels attached to a fire-resistance rated supporting structure (Item 1) with fasteners spaced not greater than 24 in. O.C. at both the top and bottom of the vertical leg. When used with Items 2 and 3, C-Channel secured back to back with 1/2 in. Type S screws spaced 24 in. OC along centerline of C-Channels. Where C-Channels form a butt joint, screws placed at both top and bottom of both sides of butt joint.

5. **Steel Studs** — Min. 3-5/8 in. wide with min. 1-5/8 in. legs containing folded back flanges and formed from min. No. 20 MSG galv. Steel. Studs to be cut 3/8 in. to 5/8 in. less than the clear span between the

vertical legs of the perimeter channels. Studs spaced a max. 16 in. OC. At each end of the stud, the top and bottom legs shall be secured to the perimeter channel with one 3/8 in. long pan-head steel screw. Studs are used at each end of the horizontal barrier to terminate the assembly at the adjoining wall. These end studs shall be secured to the adjoining wall in the same manner as the perimeter channels (Item 4). Maximum unsupported length of studs not to exceed 8 ft. 1 in.

6. **Steel Strap** — Min 4 in. wide formed from min. No. 20 MSG galv. Steel. Secured perpendicular to the studs at the centerline of the span using one 3/8 in. long pan-head steel screw. Strips to overlap one full stud bay at splice locations. As an alternate to the steel strap, C-Channels (Item 4) may be substituted and installed in the same manner as the steel straps. If a continuous piece is not used, abut channels on each side of the centerline of the span and overlap one full stud bay.

6A. **Framing Members*** — As an alternate to items 3, 4, 5, and 6 - Main runners, cross tees, cross channels and wall angle as listed below:

a. **Main Runners** — Nom 10 or 12 ft long, 15/16 in. or 1-1/2 in. wide face, spaced 4 ft OC. Main runners suspended by min 12 SWG galv steel hanger wires spaced 24 in. OC, twist tied to supporting structure.

b. **Cross Tees** — Nom 4 ft long, 1-1/2 in. wide face, installed perpendicular to the main runners, spaced 16 in. OC. The cross tees or cross channels may be riveted or screw attached to the wall angle or channel to facilitate the ceiling installation.

c. **Cross Channels** — Nom 4 ft long, installed perpendicular to main runners, spaced 16 in. OC.

d. **Wall Angle or Channel** — — Painted or galv steel angle with 1 in. legs or channel with 1 in. legs, 1-9/16 in. deep attached to walls at perimeter of ceiling with fasteners 16 in. OC. To support steel framing member ends and for screw-attachment of the gypsum panel.

ARMSTRONG WORLD INDUSTRIES INC — Type DFR-8000.

7. **Gypsum Board*** — Three layers of nom. 5/8 in. thick gypsum board installed with long dimension perpendicular to the steel studs or Framing Members*. Base secured to studs and perimeter channels with 1 in. long Type S steel screws spaced max. 16 in. OC. Middle layer secured to the studs or Framing Members* and perimeter supports with 1-5/8 in. long Type S steel screws spaced max. 16 in. OC. Middle layer edge and end joints staggered a min. 16 in. from base layer joints. Face layer secured to the studs or Framing Members* and perimeter supports with 2-1/4 in. long Type S steel screws spaced max. 12 in. OC. Face layer edge and end joints staggered a min. 16 in. from middle layer joints.

NATIONAL GYPSUM CO — Type FSW, FSW-6, FSW-C, eXP-C

8. **Joint Tape and Compound** — Not Shown — (Optional, Not Required On Joints or Screw Heads) — Vinyl, dry or premixed joint compound, applied in two coats to joints and screw heads; paper tape, nom. 2 in. wide, embedded in first layer of compound over all joints.

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2024-06-13

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- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
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BXUV – Fire Resistance Ratings – ANSI/UL 263 Certified for United States

BXUV7 – Fire Resistance Ratings – CAN/ULC-S101 Certified for Canada

[See General Information for Fire-resistance Ratings – ANSI/UL 263 Certified for United States Design Criteria and Allowable Variances](#)

[See General Information for Fire Resistance Ratings – CAN/ULC-S101 Certified for Canada Design Criteria and Allowable Variances](#)

Design No. **U906**

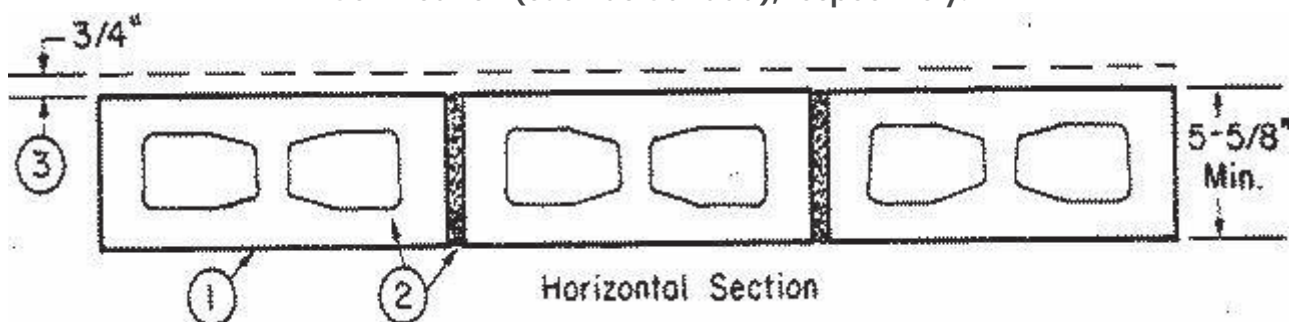
January 14, 2026

Bearing Wall Rating – 2 HR.

Nonbearing Wall Rating – 2 HR.

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide [BXUV](#) or [BXUV7](#)

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.



1. **Concrete Blocks*** — Nominal 6 by 8 by 16 in, hollow or solid. Various designs. Classification (2 hr). See **Concrete Blocks** category for list of eligible manufacturers.

ANCHOR CONCRETE PRODUCTS INC

GAGNE & SON CONCRETE BLOCK INC

GLENWOOD MASONRY PRODUCTS

Allowable compressive stress of 57% of max allowable compressive stress in accordance with the empirical design method.

OLDCASTLE APG SOUTH INC, DBA ADAMS PRODUCTS

WESTBROOK CONCRETE BLOCK CO INC

Allowable compressive stress of 75.6% of max allowable compressive stress in accordance with the empirical design method.

2. **Mortar** — Blocks laid in full bed of mortar, nom. 3/8 in. thick, of not less than 2-1/4 and not more than 3-1/2 parts of clean sharp sand to 1 part Portland cement (proportioned by volume) and not more than 50 percent hydrated lime (by cement volume). Vertical joints staggered.

3. **Portland Cement Stucco or Gypsum Plaster** — Add 1/2 hr to Classification if used. Attached to concrete blocks (Item 1).

4. **Foamed Plastic*** — (Optional-Not Shown) — 1-1/2 in. thick max, 4 ft wide sheathing attached to concrete blocks (Item 1).

ATLAS ROOFING CORP — EnergyShield Pro Wall Insulation, EnergyShield Pro 2 Wall Insulation, EnergyShield CGF Pro, EnergyShield Ply Pro, EnergyShield® CGF, EnergyShield® PanelCast, EnergyShield® and "EnergyShield® XR

DUPONT DE NEMOURS, INC. — Types Thermax Sheathing, Thermax Light Duty Insulation, Thermax Heavy Duty Insulation, Thermax Metal Building Board, Thermax White Finish Insulation, Thermax ci Exterior Insulation, Thermax XARMOR ci Exterior Insulation, Thermax IH Insulation, Thermax Plus Liner Panel, Thermax Heavy Duty Plus (HDP), TUFF-R™ ci Insulation, Thermax Butler Stylwall Insulation Board and Thermax Morton Heavy Duty Insulation Board

Amrize Building Envelope LLC — "Enverge™ CI Foil Exterior Wall Insulation" and "Enverge™ CI Glass Exterior Wall Insulation"

HUNTER PANELS, A DIVISION OF CARLISLE CONSTRUCTION MATERIALS, LLC — Types "Xci-Class A", "Xci 286", "Xci Foil (Class A)"

RMAX, A BUSINESS UNIT OF SIKA CORPORATION — Types "TSX-8500", "ECOMAXci FR", "TSX-8510", "ECOMAX xi FR White", "ECOMAXci", "ECOMAXci FR Air Barrier", "Thermasheath-XP", "Thermasheath", "Durasheath"

JOHNS MANVILLE — Type "AP Foil-Faced Foam Sheathing"

4A. Building Units* — As an alternate to Item 4, min. 1-in thick polyisocyanurate composite foamed plastic insulation boards, nom. 48 by 48 or 96 in.

ATLAS ROOFING CORP — EnergyShield® Ply

RMAX, A BUSINESS UNIT OF SIKA CORPORATION — "Thermasheath-SI", "ECOBASEci", "ThermaBase-CI", "ECOMAXci FR Ply", "ECOMAXci Ply"

4B. Foamed Plastic* — **(Optional — Not Shown)** — As an alternate to Item 4 - Expanded polystyrene insulation installed at a maximum nominal density of 2.0 lb/ft³ attached to concrete blocks (Item 1).

BASF CORP STYRENIC FOAMS DIV — Neopor® GPS and NeoTherm GPS

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Last Updated on 2026-01-14

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SECTION 07 84 13 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Penetration firestopping systems for the following applications:
 - a. Penetrations in fire-resistance-rated walls.
 - b. Penetrations in horizontal assemblies.
 - c. Penetrations in smoke barriers.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.
1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.

1.5 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Approval according to FM Approval 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 - 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."
 - 2) Intertek Group in its "Directory of Listed Building Products."
 - 3) FM Approval in its "Approval Guide."

2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. Hilti, Inc.
 - c. HoldRite; Reliance Worldwide Company.
 - d. NUCO Inc.
 - e. Roxtec.
 - f. Specified Technologies, Inc.
 - g. Tremco, Inc.
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of **0.01-inch wg (2.49 Pa)**.
 - 1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of **0.01-inch wg (2.49 Pa)**.
 - 1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
 - 2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
 - 3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.
- D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of **0.30-inch wg (74.7 Pa)**.
 - 1. L-Rating: Not exceeding **5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m)** of penetration opening at and no more than **50-cfm (0.024-cu. m/s)** cumulative total for any **100 sq. ft. (9.3 sq. m)** at both ambient and elevated temperatures.
- E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.
- F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

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

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

3.2 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches (76 mm) high and with minimum 0.375-inch (9.5-mm) strokes.
 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet (4.57 m) from end of wall and at intervals not exceeding 30 feet (9.14 m).
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 2. Contractor's name, address, and phone number.
 3. Designation of applicable testing and inspecting agency.
 4. Date of installation.
 5. Manufacturer's name.
 6. Installer's name.

3.3 FIELD QUALITY CONTROL

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

END OF SECTION 07 84 13

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes joint sealants for the following applications:
 - 1. Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 2. Interior joints in vertical surfaces and horizontal nontraffic surfaces
 - 3. Interior perimeter of partitions designated "Sound Wall" on drawings.
- B. See Section 32 13 73 "Concrete Paving Joint Sealants" for sealing joints in traffic areas such as pavements, walkways, curbing, etc.
- C. See Section 08 80 00 "Glazing" for sealants in conjunction with openings.
- D. See Section 07 21 00 "Thermal and Acoustical Insulation" for sealants in conjunction with acoustical treatment of sound walls noted on drawings.

1.2 PERFORMANCE REQUIREMENTS

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

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Preconstruction field test reports.
- D. Compatibility and adhesion test reports.
- E. Product certificates.

1.4 QUALITY ASSURANCE

- A. Preconstruction Compatibility and Adhesion Testing: Submit samples of materials that will contact or affect joint sealants to joint-sealant manufacturers for testing according to manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
- B. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to Project joint substrates according to the method in ASTM C 1193 that is appropriate for the types of Project joints.

- C. Mockups: Build mockups incorporating sealant joints, as follows, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution:
 - 1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.

1.5 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Recommendation of Acceptance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.
- B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- C. Suitability for Immersion in Liquids: Where elastomeric sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247 and qualify for the length of exposure indicated by reference to ASTM C 920 for Class 1 or 2. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- D. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- E. All sealants suitable for substrate types M, G, A, & O. Class 25, unless noted otherwise.

- 2.4 POLYSULFIDE JOINT SEALANTS: For use where could be in contact with fuels, solvents, or chemicals; exterior application such as trafficways and vehicle parking areas.
- A. Multicomponent Non-sag Polysulfide Sealant:
 - 1. Products:
 - a. Pecora Corporation; Synthacalk GC-2+.
 - b. PolySpec Corp.; Thiokol 2P.
 - c. Sonneborn, Division of ChemRex Inc.; Sonolastic Polysulfide Sealant.
 - B. Multicomponent Nonsag Immersible Polysulfide Sealant:
 - 1. Products:
 - a. Pecora Corporation; GC-2+
 - b. PolySpec Corp.; T-2235-M.
 - C. Multicomponent Pourable Polysulfide Sealant:
 - 1. Products:
 - a. Meadows, W. R., Inc.; Deck-O-Seal.
 - b. Pacific Polymers, Inc.; Elastoseal 227 Type I (Pourable).
 - D. Single-Component Nonsag Polysulfide Sealant:
 - 1. Products:
 - a. Pacific Polymers, Inc.; Elastoseal 230 Type I (Gun Grade).
 - b. Polymeric Systems Inc.; PSI-7000.
- 2.5 SILICONE JOINT SEALANTS: For use where high adhesive qualities and extensive movement is expected; interior or exterior application such as joints between sidewalks and building as well as building expansion joints.
- A. Multicomponent Nonsag Neutral-Curing Silicone Sealant:
 - 1. Products:
 - a. Dow Corning Corporation; 756 H.P.
 - b. Tremco Spectrem 4-TS
 - 2. Class: 50.
 - B. Single-Component Pourable Neutral-Curing Silicone Sealant: For use where vehicle traffic is anticipated.
 - 1. Products:
 - a. Dow Corning Corporation; 890-SL.
 - b. Pecora Corporation; 300 Pavement Sealant (Self Leveling).
 - c. Dow Corning Corporation; SL Parking Structure Sealant.
 - 2. Class: 100/50.
- 2.6 URETHANE JOINT SEALANTS: For use where high adhesive qualities and moderate movement is expected; exterior applications such as around storefront and windows.
- A. Multicomponent Nonsag Urethane Sealant:
 - 1. Products:
 - a. Pecora Corporation; Dynatrol II.

- b. Tremco; Dymeric 511.
 - c. Tremco; Vulkem 922.
 - 2. Class: 50.
- B. Multicomponent Nonsag Urethane Sealant:
 - 1. Products:
 - a. Sika Corporation, Inc.; Sikaflex - 2c NS TG.
 - b. Sonneborn, Division of ChemRex Inc.; NP 2.
 - c. Tremco; Vulkem 227.
- C. Multicomponent Nonsag Urethane Sealant:
 - 1. Products:
 - a. Bostik Findley; Chem-Calk 500.
 - b. Pacific Polymers, Inc.; Elasto-Thane 227 R Type II (Gun Grade).
 - c. Tremco; Dymeric.
 - 2. Additional Movement Capability: 40 percent movement in extension and 25 percent in compression for a total of 65 percent movement.
- D. Multicomponent Nonsag Urethane Sealant:
 - 1. Products:
 - a. Pacific Polymers, Inc.; Elasto-Thane 227 Type II (Gun Grade).
 - b. Pecora Corporation; Dynatred.
- E. Multicomponent Nonsag Immersible Urethane Sealant:
 - 1. Products:
 - a. Pecora Corporation; Dynatred.
 - b. Tremco; Vulkem 227.
 - c. Tremco; Vulkem 322 DS.
- F. Multicomponent Pourable Urethane Sealant:
 - 1. Products:
 - a. Bostik Findley; Chem-Calk 550.
 - b. Meadows, W. R., Inc.; POURTHANE.
 - c. Pecora Corporation; Urexpan NR-200.
 - d. Tremco; THC-901.
 - e. Pecora Corporation; Urexpan NR 300, Type M.
- G. Multicomponent Pourable Immersible Urethane Sealant:
 - 1. Products:
 - a. Pacific Polymers, Inc.; Elasto-Thane 227 R Type II (Self Leveling).
 - b. Tremco; Vulkem 245.
- H. Single-Component Nonsag Urethane Sealant:
 - 1. Products:

- a. Sika Corporation, Inc.; Sikaflex - 1a.
- b. Sonneborn, Division of ChemRex Inc.; NP 1.
- c. Tremco; Vulkem 116.

I. Single-Component Nonsag Urethane Sealant:

- 1. Products:
 - a. Bostik Findley; Chem-Calk 900.
 - b. Sika Corporation, Inc.; Sikaflex 15LMg
 - c. Tremco; DyMonic.
- 2. Class: 50.

2.7 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant: @ all walls designated "Sound Wall" on drawings.

- 1. Products:
 - a. Owens Corning QuietZone, premium silicone acrylic sealant.
 - b. Tremco Acoustical Sealant synthetic rubber sealant.
 - c. Sheetrock Brand Acoustical Sealant, acrylic, latex-based.

2.8 SOLVENT-RELEASE JOINT SEALANTS: For use where high adhesive qualities and high weather resistance is required.

A. Acrylic-Based Solvent-Release Joint Sealant: Comply with ASTM C 1311 or FS TT-S-00230.

- 1. Products:
 - a. Schnee-Moorehead, Inc.; Acryl-R Acrylic Sealant.
 - b. Tremco; Mono 555.

B. Butyl-Rubber-Based Solvent-Release Joint Sealant: Comply with ASTM C 1085.

- 1. Products:
 - a. Bostik Findley; Bostik 300.
 - b. Pecora Corporation; BC-158.
 - c. Sonneborn, Division of ChemRex Inc.; Sonneborn Multi-Purpose Sealant.
 - d. Tremco; Tremco Butyl Sealant.

C. Pigmented Narrow-Joint Sealant: Manufacturer's standard, solvent-release-curing, pigmented, synthetic-rubber sealant complying with AAMA 803.3 and formulated for sealing joints 3/16 inch (5 mm) or smaller in width.

- 1. Products:
 - a. Fuller, H. B. Company; SC-0289.
 - b. Schnee-Morehead, Inc.; SM 5504 Acryl-R Narrow Joint Sealant.

2.9 LATEX JOINT SEALANTS: For use where sealant is to be painted and minimum movement is expected; interior application only.

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

B. Products:

- 1. Bostik Findley; Chem-Calk 600.

2. Pecora Corporation; AC-20+.
3. Sonneborn, Division of ChemRex Inc.; Sonolac.
4. Tremco; Tremflex 834.

2.10 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type B (bicellular material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F (minus 32 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.
- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.11 MISCELLANEOUS MATERIALS

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

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants.
 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant.
 - a. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, dry, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.
 2. Remove laitance and form-release agents from concrete.

- a. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION

- A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- B. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
- F. Installation of Preformed Silicone-Sealant System: Comply with manufacturer's written instructions.
- G. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, producing seal continuity at ends, turns, and intersections of joints. For applications at low ambient

temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in compliance with sealant manufacturer's written instructions.

H. Installation of acoustical sealants:

1. Install continuous bead along edge of drywall track, each side.

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

END OF SECTION 07 92 00