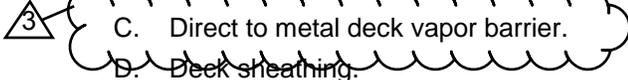


SECTION 07 53 00 - ELASTOMERIC MEMBRANE ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Elastomeric roofing membrane, adhered conventional application.
- B. Insulation, flat and tapered.
- C. Direct to metal deck vapor barrier.
- D. Deck sheathing.
- E. Flashings.
- F. Fascia.



1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood nailers and curbs.
- B. Section 07 01 50.19 - Preparation for Re-Roofing.
- C. Section 07 62 00 - SHEET METAL FLASHING AND TRIM: Counterflashings and copings.
- D. Section 07 72 00 - Roof Accessories: Roof-mounted units.
- E. Section 07 90 05 - Sealants.
- F. Section 08 62 00 - Unit Skylights: Skylight frame, integral curb, and counterflashing.

1.03 REFERENCE STANDARDS

- A. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2013.
- B. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension; 2006a.
- C. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers; 2000 (Reapproved 2012).
- D. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane; 2013.
- E. NRCA ML104 - The NRCA Roofing and Waterproofing Manual; National Roofing Contractors Association; Fifth Edition, with interim updates.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of associated counterflashings installed under other sections.

1.05 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience. Additionally, provide surety that roofing materials are compatible with adjacent weather and water barrier membrane systems.
- C. Comply with all local code requirements.
- D. Prevent chemical contaminants from coming into direct contact with the roofing membrane. If resistance to specific chemicals is required, contact the manufacturer/supplier for recommendations.

1.06 SUBMITTALS

- A. Product Data: Provide data indicating membrane materials, flashing materials, insulation, fasteners, and sealants.
- B. Shop Drawings: Include plans, elevations, sections and details which indicate joint or termination detail conditions, setting plan for tapered insulation, mechanical fastener layout, and

conditions of interface with other materials adjacent to the roofing system. Shop drawings must be signed and certified as meeting requirements of roofing warranty indicated, prior to beginning installation.

- C. Submit a letter of certification from the manufacturer which certifies the roofing contractor is authorized to install the manufacturer's roofing system and lists foremen who have received training from the manufacturer along with the dates training was received.
- D. Manufacturer's Installation Instructions: Indicate membrane seaming precautions and perimeter conditions requiring special attention.
- E. Manufacturer's Certification: Certify that project has been reviewed by roofing system manufacturer prior to installation and installation detailed in shop drawings is approved by manufacturer as meeting warranty requirements indicated.
- F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

- A. Perform work in accordance with NRCA Roofing and Waterproofing Manual and manufacturer's instructions.
- B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
- C. Source Limitations: Products used in the work included in this section shall be produced or supplied by the manufacturer and must have a history of successful production acceptable to the Owner.
- D. All products (including insulation, fasteners, fastening plates and edgings) must be manufactured and/or supplied by the roofing system manufacturer and covered by the warranty.
- E. Exterior Fire-Test Exposure: ASTM E 108, Class A; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.
- F. Preinstallation Roofing Conference: A pre-installation conference shall be held two weeks prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Attendance shall include the contractors of adjacent systems and substrates, and the roofing system manufacturer representative. Agenda for meeting shall include but not be limited to the following:
 - 1. Review of approved submittals.
 - 2. Review of surface preparation, minimum curing period and installation procedures.
 - 3. Review of special details and flashings.
 - 4. Sequence of construction, responsibilities and schedule for subsequent operations.
 - 5. Review of mock-up requirements.
 - 6. Review of inspection, testing, protection and repair procedures.
- G. Manufacturer Account Reps must be notified at project initiation
 - 1. Pre-Installation Notice (PIN) must be submitted

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Store products in weather protected environment, clear of ground and moisture, moisture, soiling, and other sources.
- C. Protect foam insulation from direct exposure to sunlight.
- D. Handle and store roofing materials and place equipment in a manner to avoid overloading and /or permanent deflection of deck.

1.09 FIELD CONDITIONS

- A. Do not apply roofing membrane during unsuitable weather.

- B. Do not apply roofing membrane when ambient temperature is below 40 degrees F without manufacturer's approval specific to this project.
- C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- D. Only as much of the new roofing as can be made weather-tight each day including all flashings and detail work, shall be installed.
- E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

1.10 WARRANTY

- A. Warranty: Total System Warranty, no dollar limit, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks from incidental membrane punctures.
 - 1. Warranty includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, and other components of membrane roofing system.
 - 2. Warranty shall include peak wind speed of 72 mph and 2" hail coverage.
 - 3. Warranty Period: 30 years from date of Substantial Completion.
 - 4. Warranty shall include labor and materials.
- B. Pro-rated System Warranties shall not be accepted.
- C. Upon completion of the installation, the applicator shall arrange for an inspection to be made by a non-sales technical representative of the membrane manufacturer in order to determine whether or not corrective work will be required before the warranty will be issued. Notify the Architect and building owner seventy-two (72) hours prior to the manufacturer's final inspection.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. EPDM Membrane Systems: Provide one of the following:
 - 1. Firestone.
 - 2. Johns Manville: www.specjm.com
- B. Fascia
 - 1. Firestone Building Products; Anchored Platinum Extended Fascia APEF-130, Black

2.02 ROOFING

- A. Elastomeric Membrane Roofing: One ply membrane, fully adhered, over insulation.
- B. Roofing Assembly Requirements:
 - 1. Insulation Thermal Value (R), minimum: 30; provide insulation of thickness required.
- C. Acceptable Insulation Types - Constant Thickness Application:
 - 1. Minimum 2 layers of polyisocyanurate board.
 - 2. Provided by membrane manufacturer.
- D. Acceptable Insulation Types - Tapered Application:
 - 1. Provide factory-tapered polyisocyanurate insulation boards fabricated to slope of 1/2 inch per 12 inches unless otherwise indicated.
 - 2. Provided by membrane manufacturer.

2.03 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

- A. Membrane: Ethylene-propylene-diene-terpolymer (EPDM); non-reinforced; complying with minimum properties of ASTM D 4637.
 - 1. Thickness: 0.090 inch.
 - 2. Color: Black.
 - 3. Tensile Strength: 1300 psi, measured in accordance with ASTM D412.
 - 4. Ultimate Elongation: 300 percent, measured in accordance with ASTM D412.
 - 5. Tear Strength: 150 lbf/in, measured in accordance with ASTM D624.

- B. Seaming Materials: Manufacturer's standard pre-manufactured synthetic-rubber polymer primer and butyl splice tape with release film or as required by manufacturer's warranty and FM Global RoofNav approved assembly.

- 3 C. Vapor Barrier: 40-mil- thick, self-adhering sheet consisting of 36 mils of rubberized asphalt laminated to a 4-mil- thick, polyethylene film with release liner on adhesive side, complying with requirements of fire rating classification; compatible with roofing and insulation materials.
1. Vapor barrier shall be provided by roofing manufacturer, or if not available from roofing manufacturer, obtained by roofing system installer by same manufacturer as water barrier membrane specified in Section 07 27 13 Water Barrier Membrane. Coordinate interface of roof system vapor barrier with water barrier membrane installer to provide continuous vapor barrier plane.

- D. Base Flashings: 90 mil EPDM.

- E. Flexible Flashing Material: Same material as membrane.

2.04 DECK SHEATHING AND COVER BOARDS

- A. Faced Polyisocyanurate Cover Board: High compressive strength board, complying with ASTM C1289, Type II, Class 4, glass fiber mat both faces, and with the following characteristics:
1. Compressive Strength: 80 psi.
 2. Board Size: 48 by 96 inch.
 3. Board Thickness: 0.5 inch.
 4. Thermal Resistance: R-value of 2.0 min..

2.05 INSULATION

- A. Polyisocyanurate Board Insulation: Rigid cellular foam, complying with ASTM C1289, Type II, Class 2, polymer bonded glass fiber mat both faces and with the following characteristics:
1. Compressive Strength: 16 psi nominal.
 2. Board Thickness: 5 inch. Install in two layers with staggered joints.
 3. Board Edges: Square.
 4. Tapered Units: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches unless otherwise indicated.

2.06 ACCESSORIES

- A. Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, thickness as required by manufacturer's warranty and per FM Global RoofNav approved assembly, but not less than 1/2 inch, factory primed.
- B. Stack Boots: Prefabricated flexible boot and collar for pipe stacks through membrane; same material as membrane.
- C. Pre-Cut Tapered Insulation:
- D. Insulation Joint Tape: Glass fiber reinforced type as recommended by insulation manufacturer, compatible with roofing materials; 6 inches wide; self adhering.
- E. Membrane Adhesive: As recommended by membrane manufacturer.
- F. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
- G. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, prepunched.
- H. Fasteners: Factory-coated steel fasteners and 18-20 ga. metal plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to roofing system manufacturer to obtain specified warranty.
- I. Expansion Joints: Provide roofing manufacturer's standard expansion joint assemblies with prefabricated units for corner and joint intersections and horizontal and vertical transitions including those to other building expansion joints, splicing units, adhesives, coatings and other components as recommended by roofing manufacturer for a complete installation covered under the specified warranty.

1. Curb-to-Curb and Cant-to-Wall expansion joint covers to be manufactured units similar to Johns Manville Expand-O-Flash expansion joint covers.
- J. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, reinforced EPDM securement strips, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.
- K. Sealants: As recommended by membrane manufacturer.
- L. Minimize roof penetrations. If structural penetrations are unavoidable, use round structural steel shapes to facilitate flashing. Means of thermal break shall be accounted for. Equipment supports for rooftop mounted equipment shall be a minimum 18 inches height. Use prefabricated equipment supports where possible. Equipment support frames or stands shall provide following working clearances:

	Width of Equipment	Height of Legs (above Finished Roof)
1.	Up to 37"	18"
2.	37 - 49"	24"
3.	49 - 61"	30"
4.	Over 60"	48"
- M. Walkway Pads: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick, and acceptable to membrane roofing system manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify deck is supported and secure.
- C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.
- D. Verify deck surfaces are dry and free of snow or ice.
- E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.
- F. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
- G. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 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. Place temporary roof drain grates when roof drain plugs are not in place.
- C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
- D. Install nailers as specified in Section 06 10 00 - Rough Carpentry and as required by manufacturer's approved shop drawings.
- E. Handle and store roofing materials and place equipment in a manner to avoid overloading and /or permanent deflection of deck.

3.03 SLOPE AND DRAINAGE

- A. The roof shall have a minimum design slope of 1/4 inch per foot. Provide tapered insulation as required to achieve required slope. Use crickets, saddles and edge strips (tapered at 2 times slope) to direct water from penetrations and parapet walls.

B. Locate roof drains at projected low points. All roofs shall have overflow systems.

3.04 VAPOR RETARDER AND INSULATION - UNDER MEMBRANE

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

B. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Apply vapor barrier to substrate board surface with adhesive in accordance with manufacturer's instructions.

1. Extend vapor barrier under cant strips and blocking to deck edge.
2. Install flexible flashing from vapor barrier to air seal material of wall construction, lap and seal to provide continuity of the air barrier plane.

D. Ensure vapor barrier is clean and dry, continuous, and ready for application of insulation.

E. Tapered Insulation:

1. Install tapered insulation with slope direction as indicated on the approved shop drawings. Miter cut all panels at valleys for tight fit and alignment throughout valley length.
2. Install tapered saddles in valleys, where indicated on the approved drawings in the sizes shown. End of saddle shall provide or slope into the sump at the drainage device. End of saddle shall be of sufficient width at sump such that flat spots do not occur in valley. Saddle slope shall be twice the field slope, unless otherwise noted on the drawings.
3. Utilize tapered insulation panels and tapered edge strips to construct sumps at roof drains and scuppers, where detailed. Size shall be as shown in approved shop drawings. Delete thermal insulation within sumps, as required, for installation of tapered panels, so as to provide continuous slope to drainage device, without creating a sharp/steep sloped transition. At no time shall slope within drain sump exceed 1:12, unless otherwise noted in drawings.
4. Install tapered crickets on the upslope sides of all rectangular penetrations with a dimension greater than 18" perpendicular to slope. Cricket slope shall be twice the field's slope, unless otherwise noted on drawings.
5. Utilize tapered edge strip at transitions in construction of more than 1/4 inch, and in other specified locations, to provide a smooth transition and proper support for the membrane system or subsequent insulation layer. Field cut and shape edge strip as required. Direct slope of edge strip so as to provide for proper drainage.
6. Verify that tapered insulation is properly installed according to the approved shop drawings and that no irregularities exist that will result in ponding water in the finished roof system.

F. Attachment of Insulation:

1. Mechanically fasten insulation to deck in accordance with roofing manufacturer's instructions. Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - a. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
 - b. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and fasten to roof deck to resist uplift pressure at corners, perimeter, and field of roof.
 - c. Install fasteners in upper flutes of metal deck.
 - 1) Where it is not possible to install fasteners in upper flutes of deck, trim fastener 3/8" from surface of deck flute.

G. Lay subsequent layers of insulation with joints staggered minimum 6 inch from joints of preceding layer.

H. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.

I. On metal deck, place boards parallel to flutes with insulation board edges bearing on deck flutes.

- J. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
- K. Tape joints of insulation in accordance with roofing and insulation manufacturers' instructions.
- L. At roof drains, use boards cut to slope to slope down to roof drains over a distance of not less than 18 inches.
- M. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and fasten to roof deck.
 - 1. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.
 - 2. Provide supplemental fasteners as required by manufacturer's warranty.
- N. Do not apply more insulation than can be covered with membrane in same day.

3.05 MEMBRANE APPLICATION

- A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.
- B. Shingle joints on sloped substrate in direction of drainage.
- C. Fully Adhered Application: Apply adhesive to substrate at rate required by manufacturer. Fully embed membrane in adhesive except in areas directly over or within 3 inches of expansion joints. Fully adhere one roll before proceeding to adjacent rolls.
- D. In addition to adhering, mechanically fasten membrane roofing securely at terminations, penetrations, and perimeters.
 - 1. Provide supplemental membrane securement as required by manufacturer's warranty.
- E. Overlap edges and ends and seal seams by contact tape or adhesive, minimum 5.5 inches. Seal permanently waterproof. Apply uniform bead of sealant to joint edge.
- F. Base Flashing Installation:
 - 1. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
 - 2. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.
 - 3. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
 - 4. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.
 - 5. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.
 - 6. Termination bars to be covered with a reglet and counterflashing even if not required by manufacturer's warranty.
- G. At intersections with vertical surfaces:
 - 1. Extend membrane over cant strips and up a minimum of 6 inches onto vertical surfaces.
 - 2. Fully adhere flexible flashing over membrane and up to nailing strips.
 - 3. Install in accordance with manufacturer's warranty requirements.
- H. Around roof penetrations, seal flanges and flashings with flexible flashing.
 - 1. Install in accordance with manufacturer's warranty requirements.
- I. Install roofing expansion joints where indicated. Make joints watertight.
 - 1. Install in accordance with manufacturer's warranty requirements.
- J. Coordinate installation of roof drains and related flashings.
 - 1. Install in accordance with manufacturer's warranty requirements.
- K. Install walkway pads in accordance with manufacturer's instructions.

3.06 FIELD QUALITY CONTROL

- A. Pre-Installation Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roof deck prior to installation and submit report to Architect.
 - 1. Notify Architect or Contracting Officer one week in advance of date and time of inspection.

- B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
 - 1. Notify Architect or Owner a week in advance of date and time of inspection.
- C. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.
- D. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.07 CLEANING

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

3.08 PROTECTION

- A. Protect installed roofing and flashings from construction operations.
- B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings, counterflashings, and gutters.
- B. Reglets and accessories.

1.02 REFERENCE STANDARDS

- A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2013.
- B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- C. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- D. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
- E. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2009.
- F. SMACNA (ASMM) - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2012.

1.03 SUBMITTALS

- A. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- B. Samples for Verification: For each type of exposed finish required, prepared on samples of size below:
 - 1. Sheet Metal Flashing: 12 inches long. Include fasteners, closures, and other attachments.
 - 2. Trim: 12 inches long. Including fasteners and other exposed accessories.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual requirements and standard details, except as otherwise indicated.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

- A. Pre-Finished Aluminum: ASTM B209 (ASTM B209M); 0.050 inch thick; plain finish shop pre-coated with fluoropolymer coating.
 - 1. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system.
 - 2. Color: Black.
- B. Stainless Steel: ASTM A666, Type 304, soft temper, 0.025 inch thick; smooth No. 4 finish.

2.02 ACCESSORIES

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolt, and other suitable fasteners designed to withstand design loads.
 - 1. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
 - 2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed with hex washer heads.

3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
 4. Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws. Use stainless steel fasteners.
- C. Underlayment: ASTM D226/D226M, organic roofing felt, Type I ("No. 15").
 - D. Slip Sheet: Rosin sized building paper.
 - E. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
 - F. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
 - G. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.
 - H. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound.
 - I. Protective Backing Paint: Zinc molybdate alkyd.

2.03 FABRICATION, GENERAL

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

2.04 SHEET METAL FABRICATIONS

- A. Copings: Fabricate in minimum 96 inch long, but not exceeding 10 foot long sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg. Miter corners, seal watertight. Fabricate from the following material:
 1. Pre-finished Aluminum: 0.050 inch.
- B. Roof Penetration Flashing: Fabricate from the following material:
 1. Stainless Steel: 0.025 inch.
- C. Roof-Drain Flashing: Fabricate from the following material:
 1. Stainless Steel: 0.025 inch.

3

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement and to comply with SMACNA's "Architectural Sheet Metal Manual". Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
- B. Secure flashings in place using concealed fasteners.
- C. Apply plastic cement compound between metal flashings and felt flashings.

- D. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar materials.
- E. Install exposed sheet metal flashing and trim without excessive oil canning, buckling and tool marks.
- F. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds and elastomeric sealant.
- G. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric sealant concealed within joints.
- H. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49.
 - 1. Interlock exterior bottom edge of coping with continuous cleats anchored to substrate at 16 inch centers.
 - 2. Anchor interior leg of coping with screw fasteners at washers at 18 inch centers.
- I. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof.
- J. Miscellaneous Trims: Install with concealed fastener. Install work with laps, joints and seams that will be permanently watertight.
- K. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

END OF SECTION

**CITY OF MADISON
LIBRARY MAINTENANCE & SUPPORT CENTER REMODEL
MADISON, WI**

**OPN PROJECT NO. 15617000
CONTRACT NO. 7564
MUNIS NO. 10001-50-140**

SECTION 08 36 13 - SECTIONAL DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Overhead sectional doors, electrically operated.
- B. Operating hardware and supports.
- C. Electrical controls.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 - Metal Fabrications: Steel channel opening frame.
- B. Section 07 90 05 - Joint Sealers: Perimeter sealant and backup materials.
- C. Section 26 05 34 - Conduit: Empty conduit from control units to door operator.
- D. Section 26 27 17 - Equipment Wiring.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2010.
- B. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- C. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2002 (Reapproved 2010).
- D. DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors; Door & Access Systems Manufacturers' Association, International; 2004.
- E. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 2014.
- F. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- C. Product Data: Show component construction, anchorage method, and hardware.
- D. Manufacturer's Installation Instructions: Include any special procedures required by project conditions.
- E. Operation Data: Include normal operation, troubleshooting, and adjusting.
- F. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years of experience.
- C. Conform to applicable code for motor and motor control requirements.
- D. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for warranty requirements.

- B. Correct defective Work within a 5 year period after Date of Substantial Completion.
- C. Warranty: Include coverage for electric motor and transmission.
- D. Provide five year manufacturer warranty for electric operating equipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- 3
- A. Basis-of-Design: The design for sectional overhead doors is based on the products indicated. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
 1. Clopay Corporation; 3220: www.clopaydoor.com.

2.02 STEEL DOOR COMPONENTS

- A. Steel Doors: Flush steel, insulated; standard clearance operating style with track and hardware.
 1. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330, using 10 second duration of maximum load.
 2. Door Assembly: Metal/foam/metal sandwich panel construction, with 1-3/4 inch wide PVC thermal break and patents pending weather-tight Dual Barrier tongue-in-groove meeting joints.
 3. Door Nominal Thickness: 2 inches thick.
 4. Exterior Steel: .015 inch, hot-dipped galvanized.
 5. Exterior Finish: Factory finished with acrylic baked enamel; color as selected from manufacturers standard line.
 6. Interior Finish: Factory finished with acrylic baked enamel; color as selected from manufacturers standard line.
 7. End Stiles: 18 gauge single end stiles. Provide with thermal break to prevent heat/cold transfer.
 8. Glazed Lights: Full panel width, 3 row; set in place with resilient glazing channel.
 9. Thermal Values: Calculated R-value of 9 min.
 10. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.
 11. Weatherstripping:
 - a. Weatherstripping:
 - 1) PVC retainer with dual durometer PVC bulb seal.
 - 2) Factory installed Flexible Header seal.
 - 3) EPDM bottom bulb seal.
 - 4) Exclusive Advanced Performance Jamb seals.
 12. Partial Glazing of Steel Panels: Color match frame with color of door, 1/2 inch insulated glazing.
 13. Finish and Color: Two coat baked-on polyester, color to be selected by Architect from manufacturer's full range of colors.
- B. Glazing: Fully tempered glass; single pane; clear; 1/2 inch thick.

2.03 DOOR COMPONENTS

- A. Tracks: Manufacturer's standard, galvanized-steel track system of configuration indicated, sized for door size and weight, designed for lift type and clearances indicated on Drawings. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Slot vertical sections of track spaced 2 inches apart for door-drop safety device. Slope tracks at proper angle from vertical or design tracks to ensure tight closure at jambs when door unit is closed. Powder coat all tracks and brackets for aluminum doors, white color. Track to extend vertically to underside of structure before turning horizontally - ensure all mechanicals are functional and do not interfere with existing structure.
- B. Hinge and Roller Assemblies: Heavy duty (14 gage) double hinges and adjustable roller holders of galvanized steel; floating hardened steel bearing rollers, located at top and bottom of each panel, each side.

- C. Lift Mechanism: Torsion spring on cross head shaft, with braided galvanized steel lifting cables. Connect to door with galvanized aircraft-type lift cables with cable safety factor of at least 7 to 1. Provide springs calibrated for a minimum of 50,000 cycles. Provide spring bumpers.
 - 1. Cable Safety Device: Include a spring-loaded, steel or bronze cam mounted to bottom door roller assembly on each side and designed to automatically stop door if either cable breaks.
 - 2. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level shaft and prevent sag.
- D. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.
- E. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.
- F. Head Weatherstripping: EPDM rubber seal, one piece full length.
- G. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.
- H. Chain Lock Keeper: Suitable for padlock.
- I. Provide safety interlock switch to disengage power supply when door is locked.

2.04 MATERIALS

- A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G60/Z180 coating, plain surface.
- B. Float Glass: Provide float glass glazing, unless noted otherwise.
 - 1. Heat-Strengthened and Fully Tempered Types: ASTM C1048.
- C. Insulation: CFC-free and HCFC-free polyurethane, fully encapsulated.

2.05 ELECTRICAL OPERATION

- A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by a testing agency acceptable to authorities having jurisdiction.
- B. General: Provide heavy-duty, electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycle requirements specified to move door in either direction at not less than 2/3 foot nor more than 1 foot per second; with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
- C. Comply with NFPA 70.
- D. Disconnect Device: Hand-operated disconnect device for automatically engaging operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount disconnect device and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
- E. Electrical Characteristics:
 - 1. Provide hp as recommended by manufacturer for door size, but not less than 1/2 hp.; manually operable in case of power failure, transit speed of not less than 12 inches per second.
 - 2. 115 volts, single phase, 60 Hz.
- F. Motor: NEMA MG 1, Type 1.
- G. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.
- H. Disconnect Switch: Factory mount disconnect switch in control panel.
- I. Electric Operator: Side mounted on cross head shaft, adjustable safety friction clutch; brake system actuated by independent voltage solenoid controlled by motor starter; enclosed gear driven limit switch; enclosed magnetic cross line reversing starter; mounting brackets and hardware.

- J. Safety Edge: At bottom of door panel, full width; electro-mechanical sensitized type, wired to stop door upon striking object; hollow neoprene covered to provide weatherstrip seal.
- K. Safety Beams: Manufacturer's photoelectric safety sensors to reverse door. Provide two on each side of every sectional door. Locate at two different heights as directed by Owner.
- L. Control Station: Standard three button (open-close-stop) momentary type control for each electric operator.
 - 1. 24 volt circuit.
 - 2. Surface mounted.
 - 3. Locate at inside door jamb.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- B. Verify that electric power is available and of the correct characteristics.

3.02 PREPARATION

- A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.

3.03 INSTALLATION

- A. Install door unit assembly in accordance with manufacturer's instructions.
- B. Anchor assembly to wall construction and building framing without distortion or stress.
- C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- D. Fit and align door assembly including hardware.
- E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.
- F. Accessibility: Install sectional doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.
- G. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 90 05.

3.04 TOLERANCES

- A. Maximum Variation from Plumb: 1/16 inch.
- B. Maximum Variation from Level: 1/16 inch.
- C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.
- D. Maintain dimensional tolerances and alignment with adjacent work.

3.05 ADJUSTING

- A. Adjust door assembly for smooth operation and full contact with weatherstripping.
- B. Have manufacturer's field representative present to confirm proper operation and identify adjustments to door assembly for specified operation.

3.06 CLEANING

- A. Clean doors and frames .
- B. Remove temporary labels and visible markings.

3.07 PROTECTION

- A. Protect installed products from damage during subsequent construction.
- B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION