SECTION 07 5400
THERMOPLASTIC MEMBRANE ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Adhered system with thermoplastic roofing membrane over cover board, over rigid board insulation, over metal roof deck.

B. Membrane Flashings.

C. Roofing strips, termination bars, sealant, stack boots and walkway pads.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Wood nailers and curbs.

B. Section 07 6200 - Sheet Metal Flashing and Trim: Counterflashings, reglets.

C. Section 07 7200 - Roof Accessories: Roof-mounted units; prefabricated curbs.

1.03 REFERENCE STANDARDS

A. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.

B. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2014.

C. ASTM D4434/D4434M - Standard Specification for Poly(Vinyl Chloride) Sheet Roofing; 2012.

D. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces; 2011.

E. NRCA ML104 - The NRCA Roofing and Waterproofing Manual; Fifth Edition, with interim updates.

1.04 PERFORMANCE REQUIREMENTS

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

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

C. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE-7, with the following uplift pressures:
   1. Field: As indicated on drawings.
   2. Perimeter: As indicated on drawings.
   3. Corner: As indicated on drawings.

D. Energy Performance:
   1. Cool Roofing: Provide roofing system with initial Solar Reflectance Index not less than 75 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency. Provide roofing system with minimum Thermal Emittance per CRRC-1 of no less than 0.75. Provide roofing system with minimum three year aged solar reflectance per CRRC-1 of 0.63.
   2. Thermal Resistance: U-factor 0.033 max. (R-30), average.

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.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1. Review preparation and installation procedures and coordinating and scheduling required with related work.

1.06 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating membrane materials, cover board, flashing materials, insulation, fasteners, and walkpads.

C. Specimen Warranty: For approval.

D. Shop Drawings: For roofing system. Include project-specific plans, elevations, sections, details, tapered insulation plan, and attachments to other Work.

E. Qualification Data: For qualified Installer.

F. Manufacturer's Installation Instructions: Indicate membrane seaming precautions and perimeter conditions requiring special attention.

G. Manufacturer's Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

H. Warranty:
1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
2. Submit installer's certification that installation complies with all warranty conditions for the waterproof membrane.

1.07 QUALITY ASSURANCE

A. Perform work in accordance with NRCA Roofing and Waterproofing Manual.

B. Installer Qualifications: Company specializing in performing the work of this section:
1. Approved by membrane manufacturer.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.

B. Store products in weather protected environment, clear of ground and moisture.

C. Protect foam insulation from direct exposure to sunlight.

1.09 FIELD CONDITIONS

A. Do not apply roofing membrane during unsuitable weather.

B. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

D. Only as much of the new roofing as can be made weathertight each day, including all flashing and detail work, shall be installed. All seams shall be heat welded before leaving the job site that day.

E. All surfaces to receive new insulation, membrane or flashings shall be dry. Should surface moisture occur, the Applicator shall provide the necessary equipment to dry the surface prior to application.

F. Uninterrupted waterstops shall be installed at the end of each day's work and shall be completely removed before proceeding with the next day's work. Waterstops shall not emit dangerous or unsafe fumes and shall not remain in contact with the finished roof as the installation progresses. Contaminated membrane shall be replaced at no cost to the Owner.

G. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, the Applicator shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A substantial protection layer consisting of plywood over Sarnafelt or plywood over insulation board shall be provided for all new and existing roof areas that receive rooftop traffic during construction.

H. Prior to and during application, all dirt, debris and dust shall be removed from surfaces either by vacuuming, sweeping, blowing with compressed air or similar methods.

1.10 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. System Warranty: Provide manufacturer's system warranty agreeing to repair or replace roofing that leaks or is damaged due to wind or other natural causes.
   1. Warranty Term: 20 years.
   2. For repair and replacement include costs of both material and labor in warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Polyvinyl Chloride (PVC) Membrane Materials:
   1. Sika Corporation – Roofing; Sarnafil PVC: usa.sarnafil.sika.com.

B. Insulation:
   1. Sika Corporation – Roofing; Sarnafil: usa.sarnafil.sika.com..

2.02 ROOFING - UNBALLASTED APPLICATIONS

A. Thermoplastic Membrane Roofing: One ply membrane, fully adhered, over insulation.

B. Acceptable Insulation Types - Constant Thickness Application: Any type that meets requirements and is approved by membrane manufacturer for application.

C. Acceptable Insulation Types - Tapered Application: Any type that meets requirements and is approved by membrane manufacturer for application.

2.03 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

A. Membrane:
   1. Material: Polyvinyl chloride (PVC) complying with ASTM D4434/D4434M.
   2. Reinforcing: Fiberglass.
   3. Backing: Feltbacked.
   4. Thickness: 0.080 inch, minimum.
   5. Sheet Width: Factory fabricated into largest sheets possible.
   6. Solar Reflectance: 0.83, minimum, initial, and 0.70, minimum, 3-year, certified by Cool Roof Rating Council.
   7. Thermal Emissivity: 0.90, minimum, initial, and 0.86, minimum, 3-year, certified by Cool Roof Rating Council.
   8. Color: White.
   9. Solar Reflectance Index (SRI): 89.
   10. Product: Sarnafil G410-20 feltback manufactured by Sika Sarnafil; www.usa.sarnafil.sika.com..

B. Flexible Flashing Material: Material recommended by membrane manufacturer.

2.04 COVER BOARDS

A. Cover Board: Glass mat faced gypsum panels, ASTM C1177/C1177M, fire resistant type, 1/2 inch thick.
   1. Manufacturers:
      a. Georgia-Pacific DensDeck Prime: www.densdeck.com.

2.05 INSULATION

A. Polyisocyanurate Board Insulation: Rigid cellular foam, complying with ASTM C1289, Type II, Class 2, Grade 2, polymer bonded glass fiber mat both faces and with the following characteristics:
   1. Compressive Strength: 20 psi
   2. Board Size: 48 by 96 inch.
   3. Board Thickness: 1.5 inch min.
   4. Thermal Resistance: R-value of 8.5.
   5. Board Edges: Square.

6. Manufacturer: Sika Sarnafil; Sarnatherm Insulation with glass fiber mat facer; www.usa.sikasarnafil.sika.com..

B. Tapered Insulation: Provide factory-tapered polyisocyanurate insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48) where used for primary slope and 1/2 inch per 12 inches (1:24) where used for back slope unless otherwise indicated.

C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes. Include on the high side of all curbs and around roof drains.

2.06 ACCESSORIES

A. Stack Boots: Prefabricated flexible boot and collar for pipe stacks through membrane; same material as membrane.

B. Insulation Fasteners: Factory-coated steel fasteners and metal plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.

C. Membrane Adhesive: As recommended by membrane manufacturer.

D. Cover Board Adhesive: As recommended by cover board manufacturer.

E. Sealants: One-component, polyurethane sealant.
1. Sika Sikaflex 1A.

F. PVC Coated Metal: PVC membrane laminated to 24 gauge G-90 galvanized steel.

G. Termination Bars: Manufacturer's standard, predrilled r aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors.

H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, stainless steel clamps, sealants, separation tapes, asphalt-resistant PVC flashings, and other accessories.

I. Walkway Pads: Suitable for maintenance traffic, contrasting color or otherwise visually distinctive from roof membrane.
1. Composition: Roofing membrane manufacturer's standard.
2. Size: Manufacturer's standard size(s).
3. Manufacturers:
a. Sika Sarnafil; Crossgrip XTRA; www.usa.sikasarnafil.sika.com..

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Perform work in accordance with NRCA Roofing and Waterproofing Manual and manufacturer's instructions.

B. Do not apply roofing membrane during unsuitable weather.

C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.

D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

F. Coordinate the work with installation of associated counterflashings installed by other sections as the work of this section proceeds.

G. Space penetrations a minimum of 12 in. apart, and from any adjacent items such as parapets, curbs, penetrations.

H. Install 18GA, G90, 4 in. wide steel backing strips over metal framed parapet walls and interior wall framing where roofing termination bars are required. Coordinate locations of steel backing strips with roofing contractor.

3.02 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, nailing strips, and reglets are in place.

3.03 VAPOR RETARDER AND INSULATION - UNDER MEMBRANE

A. Install two layers of Insulation.

B. Attachment of Insulation:
   1. Mechanically fasten first layer of insulation to deck in accordance with roofing manufacturer's instructions.
   2. Mechanically fasten subsequent layer of insulation to deck in accordance with roofing manufacturer's instructions.

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

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

E. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.

F. Do not apply more insulation than can be covered with membrane in same day.

3.04 COVERBOARD APPLICATION

A. Install coverboard over instulation at all locations.

B. Adhere coverboard with low rise foam adhesive in accordance with manufacturer's instructions.

C. Install coverboard in lieu of exterior wall sheathing, thickness to match exterior wall sheathing, on all parapet and wall substrates to receive roof membrane flashing.

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 of manufacturer's required gal/square. 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. Overlap edges and ends and seal seams by heat welding, minimum 3 inches. Seal permanently waterproof.

E. Welded Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
   1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
   2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
   3. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.

F. At intersections with vertical surfaces:
   1. Extend membrane over cant strips and up a minimum of 8 inches onto vertical surfaces.
   2. Fully adhere flexible flashing over membrane and up to reglets.
   3. Insert flashing into reglets and secure.

G. Around roof penetrations, seal flanges and flashings with flexible flashing.

H. Coordinate installation of roof drains and sumps and related flashings.

I. Prime the back-side of the roof membrane prior to applying sealant to the membrane around the roof drain clamping rings.

J. Install supplemental PVC flashing membrane storm collar with clamping band and sealant above the collar, above all roof membrane terminations on electrical, plumbing, and other vertical penetrations.

K. Provide continuity of the waterproofing systems with adjacent water-resistive barriers. Install foil tape separation between the PVC flashing membrane, and self-adhered flashings.

3.06 WALKPAD APPLICATION

A. Install walkway pads secured with 1 inch width PVC membrane ties to the roof membrane at 4 in. on center.

3.07 CLEANING

A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

B. Remove bituminous markings from finished surfaces.

C. 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.

D. 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