

## **SECTION 075300 - EPDM ROOFING SYSTEM**

### **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. Fully-adhered ethylene-propylene-diene-terpolymer (EPDM) roofing system.
  - 2. Roof-edge specialties and terminations.
  - 3. Substrate board.
  - 4. Roof insulation.
  - 5. Cover board.

#### **1.3 DESCRIPTION OF WORK**

- A. Provide and install .060 inch thick (60 mils) non-reinforced EPDM membrane fully adhered roofing system including substrate board, vapor barrier, insulation, cover board, EPDM membrane and all required flashings and terminations.

#### **1.4 DEFINITIONS**

- A. Roofing Terminology: Definitions in ASTM D1079 and glossary of NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

#### **1.5 SUBMITTALS**

- A. Product Data: For each type of product.
- B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:
  - 1. Layout and thickness of insulation.
  - 2. Base flashings and membrane terminations.
  - 3. Flashing details at penetrations.
  - 4. Roof plan showing orientation of steel roof deck and orientation of roof membrane and fastening spacings and patterns for mechanically fastened roofing system.
  - 5. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
  - 6. Tie-in with air barrier.

- C. Samples for Verification: For the following products:
  - 1. Roof membrane and flashings of color required.
- D. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.
- E. Qualification Data: For Installer and manufacturer.
- F. Manufacturer Certificates:
  - 1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
    - a. Submit evidence of complying with performance requirements.
  - 2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.
- G. Product Test Reports: For components of roof membrane and insulation, for tests performed by a qualified testing agency, indicating compliance with specified requirements.
- H. Sample Warranties: For manufacturer's special warranties.

#### 1.6 CLOSEOUT SUBMITTALS

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

#### 1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is UL listed for roofing system identical to that used for this Project.
- B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

## 1.9 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.

## 1.10 WARRANTY

- A. Provide manufacturer's **25 year Total System Edge-to-Edge Warranty** covering both labor and material with no dollar limitation. The maximum wind speed coverage shall be peak gusts of 90 mph measured at 10 meters above ground level. Certification is required with submittals indicating the manufacturer has reviewed and agreed to such wind coverage. All products including substrate boards, vapor retarders, insulation, fasteners, fastening plates and edgings must be manufactured and/or supplied by the roofing system manufacturer and covered by the warranty.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing system 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 flashings shall remain watertight.
  1. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
  2. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D3746, ASTM D4272, or the Resistance to Foot Traffic Test in FM Approvals 4470.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.
- C. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897:

1. Zone 1 (Roof Area Field): -14 lbf/sq. ft.
  2. Zone 2 (Roof Area Perimeter): -24 lbf/sq. ft.
    - a. Location: From roof edge to 12'-3" inside roof edge.
  3. Zone 3 (Roof Area Corners): -36 lbf/sq. ft.
    - a. Location: 12'-3" in each direction from building corner.
  4. Wind Uplift Load Capacity: 120 psf.
- D. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

## 2.2 ETHYLENE-PROPYLENE-DIENE-TERPOLYMER (EPDM) ROOFING

- A. EPDM Sheet: ASTM D4637/D4637M, Type II, scrim or fabric internally reinforced, EPDM sheet. When a 10-foot wide membrane is to be used, the membrane shall be manufactured in a single panel with no factory splices to reduce splice intersections with 6 inch factory applied tape.
1. Basis-of-Design Product: Subject to compliance with requirements, provide **Carlisle SynTec Incorporated; Sure-Seal EPDM** or a comparable product by one of the following:
    - a. Firestone Building Products.
    - b. Johns Manville; a Berkshire Hathaway company.
  2. Thickness: 60 mils (1.5 mm), nominal.
  3. Exposed Face Color: Black.
  4. Source Limitations: Obtain components for roofing system from roof membrane manufacturer.
- B. *Note: For all components that are part of the new roofing system, **basis-of-design remains the Carlisle Syntec Systems.** If a comparable product is submitted, all components of the roofing system must be from that same manufacturer and must be comparable to the basis-of-design.*

## 2.3 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.
1. Adhesive and Sealants: Comply with VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: 60-mil- (1.5-mm-) thick EPDM, partially cured or cured, according to application.

- C. Protection Sheet: Epichlorohydrin or neoprene nonreinforced flexible sheet, **55 to 60 mils (1.4 to 1.5 mm)** thick, recommended by EPDM manufacturer for resistance to hydrocarbons, non-aromatic solvents, grease, and oil.
- D. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.
- E. Bonding Adhesive: Manufacturer's standard, low VOC.
- F. Seaming Material: Manufacturer's standard, synthetic-rubber polymer primer and **6-inch-** wide minimum, butyl splice tape.
- G. Lap Sealant: Manufacturer's standard, single-component sealant, colored to match membrane roofing.
- H. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.
- I. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors.
- J. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening components to substrate, and acceptable to roofing system manufacturer.
- K. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, molded pipe boot 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.
- L. HP Fasteners: a threaded, black epoxy electro-deposition coated fastener used with steel and wood roof decks.
- M. InsulFast Fasteners: A threaded #12 fastener with #3 Phillips head used for insulation and underlayment board attachment into steel or wood decks.
- N. Hammer Screw: an expansion anchor with stainless steel drive pin used for fastening the Sure-Seal Termination Bar or Seam Fastening Plates to concrete, brick, or block walls.
- O. HP 14 -10 Fasteners: A #14 threaded fastener used for minimum 3,000 psi concrete decks.
- P. Insulation Fastening Plates: a nominal 3 inch diameter plastic or metal plate used for insulation attachment in conjunction with HP Fasteners or Concrete Spikes.
- Q. Seam Fastening Plates: a 2 inch diameter steel, FM approved metal plate used in conjunction with RUSS or with EPDM membrane for membrane securement.
- R. RUSS (Reinforced Universal Securement Strip): a 6 or 9 inch wide, 100 foot long strip of reinforced EPDM membrane.
  - 1. The 6 inch wide RUSS shall be utilized horizontally or vertically (in conjunction with Seam Fastening Plates) below the EPDM membrane for additional membrane securement.

2. The 9 inch wide RUSS shall be utilized in conjunction with metal edgings to allow the continuation of the EPDM deck membrane as flashing at all corner areas (20 foot in each direction) in accordance with details.

## 2.4 ROOF-EDGE SPECIALTIES AND TERMINATIONS

- A. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet (3.6 m) and a continuous metal receiver with integral drip-edge cleat to engage fascia cover and secure single-ply roof membrane. Provide matching corner units.
  1. High performance gravel stop shall be Certified by the gravel stop manufacturer to comply with ANSI/SPRI Standard ES-1-98. Roof edge/gravel-stop shall meet performance design criteria according to the following test standards:
  2. ANSI/SPRI ES-1-98 Test Method RE-1 Test for Roof Edge Termination of Single-ply Roofing Membranes: The fascia system shall be tested to secure the membrane to minimum 100 lbs./ft in accord with the ANSI/SPRI ES-1-98 Test Method RE-1. Use the current edition of ANSI/SPRI ES-1 Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.
  3. ANSI/SPRI ES-1-98 Test Method RE-2 Pull-Off Test for Fascia: The fascia system shall be tested in accord with the ANSI/SPRI ES-1-98 Test Method RE-2. Use the current edition of ANSI/SPRI ES-1 Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.
  4. FMRC Loss Prevention Data Sheet 1-49 "Perimeter Flashing." The fascia product shall be listed in current Factory Mutual Research Corporation Approval Guide.
- B. All metal edging and terminations shall be by the roofing manufacturer.
- C. Basis-of-Design Product: Subject to compliance with requirements, provide **Carlisle Syntec Systems; SecurEdge 200 MF-1A Roof Edge System**. or a comparable product by one of the following:
  1. Exceptional Metals.
  2. Hickman Company, W. P.
  3. Metal-Era, Inc.
    - a. Metallic-Coated Steel Sheet Fascia Covers: Aluminum .050-inch thickness
    - b. Surface: Smooth finish.
    - c. Finish: Two-coat fluoropolymer.
    - d. Color: As selected by Architect from manufacturer's full range.
    - e. Corners: Factory mitered and continuously welded.
    - f. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.
    - g. Receiver: 20 gauge Galvanized steel.
    - h. Fascia Accessories: Provide as required to complete fascia as detailed on drawings.
- D. Termination Bar: a 1 inch wide and .098 inch thick extruded aluminum bar pre-punched 6 inches on center; incorporates a sealant ledge to support Lap Sealant and provide increased

stability for membrane terminations. The required metal edge detail for this project shall be Carlisle Detail U-9A.

## 2.5 SUBSTRATE BOARDS

- A. Substrate Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum board or ASTM C1278/C1278M, fiber-reinforced gypsum board.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **Carlisle Syntec Systems; Carlisle Securock**, or approved equal.
    - a. Thickness: 1/2 inch.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate panel to roof deck.

## 2.6 VAPOR RETARDER

- A. Self-Adhering-Sheet Vapor Retarder: ASTM D1970/D1970M, polyethylene film laminated to layer of rubberized asphalt adhesive, minimum 40-mil- (1.0-mm-) total thickness; maximum permeance rating of 0.05 perm; cold applied. Provide primer when recommended by vapor retarder manufacturer. Vapor retarder must be rated by the manufacturer as a temporary roof with an allowable exposure to the elements for 90 days.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide **Carlisle Syntec Systems; Carlisle 725 TR Air and Vapor Barrier**, or approved equal.

## 2.7 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured by EPDM roof membrane manufacturer.
- B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.
- C. Basis-of-Design Product: Subject to compliance with requirements, provide **Carlisle Syntec Systems; Insulbase Polyisocyanurate**, or approved equal.
  - 1. Compressive Strength: 20 psi (138 kPa) minimum.
  - 2. Size: 48 by 96 inches.
  - 3. Thickness: 6 inches or R-value of 30

## 2.8 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.

- B. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
  - 1. Full-spread, spray-applied or bead-applied, low-rise, two-component urethane adhesive.
  - 2. Basis-of-Design Product: Subject to compliance with requirements, provide **Carlisle Syntec Systems; FAST Adhesive**, or approved equal.
- C. Cover Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum substrate, or ASTM C1278/C1278M, fiber-reinforced gypsum board.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **Carlisle Syntec Systems; Carlisle Securock**, or approved equal.
    - a. Thickness: 1/2 inch.

### 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 blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
- 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 system 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 OF ROOFING, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions, FM Approvals' RoofNav assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.



- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

### 3.4 INSTALLATION OF SUBSTRATE BOARD

- A. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than 24 inches (610 mm) in adjacent rows.
  - 1. At steel roof decks, install substrate board at right angle to flutes of deck.
    - a. Locate end joints over crests of steel roof deck.
  - 2. Tightly butt substrate boards together.
  - 3. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.
  - 4. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.

### 3.5 INSTALLATION OF VAPOR RETARDER

- A. Self-Adhering-Sheet Vapor Retarder: Prime substrate if required by manufacturer. Install self-adhering-sheet vapor retarder over area to receive vapor retarder, side and end lapping each sheet a minimum of 2-1/2 inches.
  - 1. Extend vertically up parapet walls and projections to a minimum height equal to height of insulation and cover board.
  - 2. Continuously seal side and end laps with adhesive.
  - 3. Place membrane carefully so as to avoid wrinkles and fish mouths. Immediately after installation, roll with a 100-150 pound weighted steel roller. There shall be no gaps in the vapor barrier application.
- B. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into roofing system.

### 3.6 INSTALLATION OF INSULATION

- A. Coordinate installing roofing system components, so insulation is not exposed to precipitation or left exposed at end of workday.
- B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Installation Over Metal Decking:
  - 1. Install insulation with end joints staggered not less than 12 inches (305 mm) in adjacent rows.

- a. Where installing composite and non-composite insulation in two or more layers, install non-composite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
- b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
- c. Make joints between adjacent insulation boards not more than 1/4 inch (6 mm) in width.
- d. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
- e. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
  - 1) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.

### 3.7 INSTALLATION OF COVER BOARDS

- A. 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 (150 mm) in each direction.
  1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
  2. Cut and fit cover board tight to nailers, projections, and penetrations.
  3. Adhere cover board to substrate using adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:
    - a. Set cover board in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

### 3.8 INSTALLATION OF ADHERED ROOF MEMBRANE

- A. Unroll and position membrane without stretching. Allow the membrane to relax for approximately 1/2 hour before bonding. Fold the sheet back onto itself so half the underside of the membrane is exposed.
- B. Apply the Bonding Adhesive in accordance with the manufacturer's published instructions, to both the underside of the membrane and the substrate. Allow the adhesive to dry until it is tacky but will not string or stick to a dry finger touch.
  1. Roll the coated membrane into the coated substrate while avoiding wrinkles. Brush down the bonded half of the membrane sheet with a soft bristle push broom to achieve maximum contact.
  2. Fold back the unbonded half of the membrane sheet and repeat the bonding procedure.
- C. Install adjoining membrane sheets in the same manner, overlapping edges approximately 7 inches. Do not apply bonding adhesive to the splice area.

- D. Strict care must be taken to make sure that bonding adhesive and bonding adhesive can stains are prevented on the finished roof membrane. Any short or long term storage of metal containers that can rust will require a separator sheet on the finished roof membrane.

### 3.9 MEMBRANE SPLICING

- A. 6 inch pre-applied splice tape is required for this project, no exceptions or deviations.
- B. Overlap adjacent sheets and mark a line 1/2 inch out from the top sheet.
- C. Fold the top sheet back and clean the dry splice area (minimum 6 inches wide) of membrane with Sure-Seal Primer as required by the membrane manufacturer.
- D. Apply Primer to the EPDM sheet. Press Membrane and tape onto the sheet using hand pressure.
- E. Remove the release film and press the top sheet onto the tape using hand pressure.
- F. Roll the seam toward the splice edge with a 2 inch wide steel roller.
- G. Splice intersections are to be overlaid with a layer of 6" x 6" and a 12" x 12" Pressure-Sensitive flashing.
- H. All field and flashing splices are to be sealed with Lap Sealant and installed per manufacturer's details.

### 3.10 INSTALLATION OF BASE FLASHING

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. 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.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

### 3.11 INSTALLATION OF COATINGS

- A. Apply coatings to roof membrane and base flashings according to manufacturer's written recommendations, by spray, roller, or other suitable application method.

3.12 FIELD QUALITY CONTROL

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Architect, and to prepare inspection report.
- B. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.13 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 system, inspect roofing system 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.

END OF SECTION 075300