

## **SECTION 075419 - POLYVINYL-CHLORIDE (PVC) ROOFING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Polyvinyl chloride (PVC) roofing system.
2. Accessory roofing system materials.
3. Substrate board.
4. Vapor retarder.
5. Roof insulation and accessories.
6. Cover board.

- B.** Section contains the installation of sound-absorbing insulation strips in ribs of acoustical steel roof deck. Sound-absorbing insulation strips are furnished under Section 053100 "Steel Decking."

#### **1.2 DEFINITIONS**

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

#### **1.3 ACTION SUBMITTALS**

**A. Product Data:**

1. 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 and sheet flashings and membrane termination details.
3. Flashing details at penetrations.
4. Tapered insulation layout, thickness, and slopes.
5. Roof plan showing orientation of roof deck and orientation of roofing membrane, fastening spacings, and patterns for corner, perimeter, and field-of-roof locations.
6. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
7. Crickets, saddles, and tapered edge strips, including slopes.

- C.** Wind-Uplift-Resistance Submittal: For roofing system, indicating compliance with wind-uplift performance requirements.

#### **1.4 QUALITY ASSURANCE**

- A.** Manufacturer Qualifications: A qualified manufacturer that is listed in SPRI's "Directory of Roof Assemblies" for roofing system identical to that used for this Project.

- B. Installer Qualifications: A qualified firm that is approved, authorized, certified, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing system 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.
  - 1. Protect stored liquid material from direct sunlight.
  - 2. 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.
  - 1. Store in a dry location.
  - 2. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing system materials, and place equipment in a manner to avoid permanent deflection of deck.

#### 1.6 FIELD CONDITIONS

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

#### 1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
  - 1. Special warranty to include all components of roofing system, such as substrate board, vapor retarder, roof insulation, fasteners, adhesives, cover board, roofing membrane, base flashing sheet, walkways, and other components of roofing system.
  - 2. Warranty Period: 20 years from date of Final Acceptance.
- B. Roofing System Installer's Warranty: Submit Roofing System Installer's warranty, on warranty form at end of this Section, signed by Roofing System Installer, covering the Work of this Section, including all components of roofing system, such as substrate board, vapor retarder, roof insulation, fasteners, adhesives, cover board, roofing membrane, base flashing sheet, and other components of roofing system.

1. Warranty Period: Five years from date of Final Acceptance.

## **PART 2 - PRODUCTS**

### **2.1 SOURCE LIMITATIONS**

- A. Obtain components for roofing system from manufacturer approved by roofing membrane manufacturer.

### **2.2 PERFORMANCE REQUIREMENTS**

- A. General Performance: Installed roofing system and flashings to 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 system and flashings to remain watertight.
  1. Accelerated Weathering: Roofing membrane to withstand 2000 hours of exposure when tested in accordance with ASTM G152, ASTM G154, or ASTM G155.
  2. Impact Resistance: Roofing membrane to resist impact damage when tested in accordance with ASTM D3746/D3746M, ASTM D4272/D4272M, or the Resistance to Foot Traffic Test in FM Approvals 4470.
- B. Material Compatibility: Roofing system materials to be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.
- C. FM Approvals' RoofNav Listing: Roofing membrane, base flashings, and component materials to comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system and are listed in FM Approvals' RoofNav for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals Certification markings.
  1. Fire/Windstorm Classification: Class 1A-120.
- D. SPRI's "Directory of Roof Assemblies" Listing: Roofing membrane, base flashings, and component materials to comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system and are listed in SPRI's "Directory of Roof Assemblies" for roof assembly identical for that specified for this Project.
  1. Wind-Uplift Load Capacity: 120 psf.
- E. Exterior Fire-Test Exposure: Class A; for application and roof slopes indicated; when tested by a qualified testing agency in accordance with ASTM E108 or UL 790.
  1. Identify products with appropriate markings of applicable testing agency.

### **2.3 POLYVINYL CHLORIDE (PVC) ROOFING SYSTEM**

- A. PVC Sheet Type III: ASTM D4434/D4434M, fabric reinforced.

1. 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:
  - a. Carlisle Syntec Systems
  - b. Cooley Group
  - c. Duro-Last Inc.
  - d. GAF
  - e. Johns Manville; a Berkshire Hathaway company
  - f. Soprema, Inc.
  - g. Versico Roofing Systems; Carlisle Construction Materials
2. Thickness: 60 mils (nominal).
3. Exposed Face Color: White.

- B. Source Limitations: Obtain components for roofing system from manufacturers approved by roof membrane manufacturer.

#### 2.4 ACCESSORY ROOFING SYSTEM MATERIALS

- A. General: Accessory materials as recommended in writing by roofing membrane manufacturer for intended use and compatible with other roofing system components.
- B. Base and Sheet Flashings: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as roofing membrane.
- C. Prefabricated Pipe Flashings: As recommended in writing by roofing membrane manufacturer.
- D. Roof Vents: As recommended in writing by roofing membrane manufacturer.
  1. Size: Not less than 4-inch diameter.
- E. Bonding Adhesive: Roofing membrane manufacturer's standard, water based.
- F. Water-Based, Fabric-Backed Membrane Adhesive: Roofing membrane manufacturer's standard water-based, cold-applied adhesive formulated for compatibility and use with fabric-backed roofing membrane.
- G. Safety Accessories: Roofing membrane manufacturer's standard yellow seaming tape for designating safety perimeters and rooftop hazards.
- H. Miscellaneous Accessories: As recommended in writing by roofing membrane manufacturer.

#### 2.5 SUBSTRATE BOARD

- A. Fiber-Reinforced Gypsum Roof Board: ASTM C1278/C1278M, cellulosic-fiber reinforced, water-resistant gypsum board.
  1. Thickness: 5/8 inch.

- B. High-Density Polyisocyanurate Cover Board: ASTM C1289, Type II, Class 4, Grade 1, 1/2 inch thick, having a minimum compressive strength of 80 psi.
- C. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.
- D. Bonding Adhesive: Manufacturer's standard, designed for adhering substrate board to roof deck.

## 2.6 VAPOR RETARDER

- A. Rubberized-Asphalt-Sheet Vapor Retarder, Self-Adhering: ASTM D1970/D1970M, polyethylene film laminated to layer of rubberized asphalt adhesive, minimum 40-mil total thickness; maximum permeance rating of 0.1 perm; cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor retarder manufacturer.

## 2.7 ROOF INSULATION AND ACCESSORIES

- A. General: Preformed roof insulation boards manufactured or approved by roofing membrane manufacturer approved for use in SPRI's "Directory of Roof Assemblies" listed roof assemblies.
- B. Tapered Insulation: Provide factory-tapered insulation boards.
  - 1. Material: Match roof insulation.
  - 2. Minimum Thickness: 1/4 inch.
  - 3. Slope:
    - a. Roof Field: 1/4 inch per foot unless otherwise indicated on Drawings.
    - b. Saddles and Crickets: 1/2 inch per foot unless otherwise indicated on Drawings.
- C. General: Roof insulation accessories as recommended in writing by insulation manufacturer for intended use and compatibility with other roofing system components.
  - 1. Insulation Adhesive: Insulation manufacturer's standard adhesive formulated to attach roof insulation to substrate to another insulation layer as follows:
    - a. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.
  - 2. Insulation Fasteners: Insulation manufacturer's standard factory-coated steel fasteners with metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover board to substrate, and acceptable to roofing system manufacturer.

## 2.8 COVER BOARD

- A. General: Cover board as recommended in writing by roofing membrane manufacturer

for intended use and compatible with other roofing system components.

- B. Fiber-Reinforced Gypsum Roof Board: ASTM C1278/C1278M, cellulosic-fiber-reinforced, water-resistant gypsum board.

- 1. Thickness: 5/8 inch.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Roofing System 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.
  - 3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 053100 "Steel Decking."
- 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 in accordance with 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.
- C. Install sound-absorbing insulation strips in ribs of acoustical steel roof deck in accordance with roof deck manufacturer's written instructions.

#### **3.3 INSTALLATION OF POLYVINYL-CHLORIDE (PVC) ROOFING SYSTEM, GENERAL**

- A. Install roofing system materials and components in accordance with roofing system manufacturer's written installation instructions, SPRI's "Directory of Roof Assemblies" listed roof 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.
- C. Substrate-Joint Penetrations: Prevent adhesives from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

### 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 in adjacent rows.
  - 1. Install substrate board at right angle to flutes of steel roof deck. 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 in accordance with manufacturer's written installation instructions and SPRI's "Directory of Roof Assemblies" listed roof assembly requirements for specified wind-uplift load capacity and FM Global Property Loss Prevention Data Sheet 1-29.
  - 5. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof in accordance with roofing system manufacturers' written installation instructions.

### 3.5 INSTALLATION OF VAPOR RETARDER

- A. Install vapor retarder in a single layer over roof area in accordance with manufacturer's written installation instructions, side and end lapping each sheet a minimum of 2 and 6 inches, respectively.
  - 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 tape.
- B. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into roofing system.

### 3.6 INSTALLATION OF PVC ROOFING MEMBRANE

- A. Install roofing membrane over roof area for adhered application method in accordance with roofing system manufacturer's written installation instructions.
- B. Unroll roofing membrane and allow it to relax before installing.
- C. Start installation in presence of roofing system manufacturer's technical personnel.
- D. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps. Apply roofing membrane with side laps shingled with slope of roof deck where possible.
- E. Adhered Application: Apply bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Do not apply to splice area of roofing membrane.
  - 1. In addition to adhering, mechanically fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.

- F. Seams and End Laps: Clean seam areas, overlap membrane, and hot-air-weld side seams and end laps of roofing membrane and sheet flashing to ensure a watertight installation.
  - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roofing membrane and sheet flashings.
  - 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 membrane that do not comply with requirements.
- G. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

### 3.7 INSTALLATION OF BASE AND SHEET FLASHINGS

- A. General: Install and adhere base and sheet flashings and preformed flashing accessories to substrates in accordance with roofing system manufacturer's written installation instructions.
- B. Apply bonding adhesive to substrate and underside of flashings 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.
- D. Clean seam areas, overlap, and firmly roll flashings into the adhesive. Hot-air-weld side seams and end laps to ensure a watertight installation.
- E. Terminate and seal top of flashings and mechanically anchor to substrate through termination bars.

### 3.8 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 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 Completion and in accordance with warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

### 3.9 ROOFING SYSTEM INSTALLER'S WARRANTY

- A. WHEREAS \_\_\_\_\_ of \_\_\_\_\_, herein called the "Roofing System Installer," has performed roofing and associated Work on the following Project:

1. Owner: <Insert name of Owner>.
  2. Owner Address: <Insert address>.
  3. Building Name/Type: <Insert information>.
  4. Building Address: <Insert address>.
  5. Area of Work: <Insert information>.
  6. Acceptance Date: \_\_\_\_\_.
  7. Warranty Period: Two years from date of Final Completion.
  8. Date of Final Acceptance: \_\_\_\_\_.
- B. AND WHEREAS Roofing System Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said Work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing System Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period Roofing Installer will, at Roofing System Installer's own cost and expense, make or cause to be made such repairs to or replacements of said Work as are necessary to correct faulty and defective work and as are necessary to maintain said Work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
1. Specifically excluded from this Warranty are damages to Work and other parts of the building, and to building contents, caused by:
    - a. lightning;
    - b. peak gust wind speed exceeding <Insert mph>;
    - c. fire;
    - d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
    - e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the Work;
    - f. vapor condensation on bottom of roofing; and
    - g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
  2. When Work has been damaged by any of foregoing causes, Warranty will be null and void until such damage has been repaired by Roofing System Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
  3. Roofing System Installer is responsible for damage to Work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of Work.
  4. During Warranty Period, if Owner allows alteration of Work by anyone other than Roofing System Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty will become null and void on date of said alterations, but only to the extent said alterations affect Work covered by this Warranty. If Owner engages Roofing System Installer to perform said alterations, Warranty will not become null and void unless Roofing System Installer, before

starting said Work, will have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate Work, thereby reasonably justifying a limitation or termination of this Warranty.

5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty will become null and void on date of said change, but only to the extent said change affects Work covered by this Warranty.
6. Owner will promptly notify Roofing System Installer of observed, known, or suspected leaks, defects, or deterioration and afford reasonable opportunity for Roofing System Installer to inspect Work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing System Installer on said Work and will not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty will not operate to relieve Roofing System Installer of responsibility for performance of original Work in accordance with requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_.

1. Authorized Signature: \_\_\_\_\_.
2. Name: \_\_\_\_\_.
3. Title: \_\_\_\_\_.

END OF SECTION 075419