

SECTION 075423 – THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

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PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Adhered TPO membrane roofing system.

1.1.2 PERFORMANCE REQUIREMENTS

- A. Energy Performance: Provide roofing systems that comply with either Option 1 or Option 2 below.
 1. Option 1
 - a. Three-year aged solar reflectance of not less than 0.55 when tested in accordance with ASTM C1549, ASTM E903, or CRRC-1 Standard.
 - b. Three-year aged thermal emittance of 0.75 when tested in accordance with ASTM C1371 or ASTM E408 or CRRC-1 Standard.
 2. Option 2: Three-year aged solar reflectance index of 64 when calculated according to ASTM E 1980 using a convection coefficient of 2.1 Btu/h x ft² x °F. Calculation shall be based on aged tested values of solar reflectance and thermal emittance.
- A. Energy Performance: Provide roofing systems that comply with either Option 1 or Option 2 below.
 1. Option 1
 - a. Three-year aged solar reflectance of not less than 0.55 when tested in accordance with ASTM C1549, ASTM E903, or CRRC-1 Standard.
 - b. Three-year aged thermal emittance of 0.75 when tested in accordance with ASTM C1371 or ASTM E408 or CRRC-1 Standard.
 2. Option 2
 - a. Initial solar reflectance of not less than 0.70 when tested in accordance with ASTM C1549, ASTM E903, or CRRC-1 Standard.
 - b. Initial thermal emittance of 0.75 when tested in accordance with ASTM C1371 or ASTM E408 or CRRC-1 Standard.
 3. Option 3: Three-year aged solar reflectance index of 64 when calculated according to ASTM E 1980 using a convection coefficient of 2.1 Btu/h x ft² x °F. Calculation shall be based on aged tested values of solar reflectance and thermal emittance.
 4. Option 4: Initial solar reflectance index of 82 when calculated according to ASTM E 1980 using a convection coefficient of 2.1 Btu/h x ft² x °F. Calculation shall be based on aged tested values of solar reflectance and thermal emittance.

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- B. 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.

1.2 SUBMITTALS

- A. General: Submit in accordance with Section 013300.
B. See Section 013310 for Submittal Schedule.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product.
B. Source Limitations: Obtain components including roof insulation and fasteners for membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.
C. 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.

1.4 WARRANTY

Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.

- A. _____
B. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TPO MEMBRANE ROOFING

- A. Fabric-Reinforced Thermoplastic Polyolefin Sheet: ASTM D 6878, scrim reinforced, uniform, flexible, TPO sheet.
1. Manufacturers: Subject to compliance with requirements, provide the following:
2. Firestone Building Products Company, UltraPly TPO
3. Approved equal.
B. Thickness: 60 mils, nominal.
C. Color: White

2.2 AUXILIARY MEMBRANE ROOFING MATERIALS

- A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.
B. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
~~Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the~~

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following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Plastic Foam Adhesives: 50 g/L.
2. Gypsum Board and Panel Adhesives: 50 g/L.
3. Multipurpose Construction Adhesives: 70 g/L.
4. Fiberglass Adhesives: 80 g/L.
5. Contact Adhesive: <250 g/L.
6. Other Adhesives: 250 g/L.
7. Single-Ply Roof Membrane Sealants: 450 g/L.
8. Non-membrane Roof Sealants: 300 g/L.
9. Sealant Primers for Nonporous Substrates: 250 g/L.
10. Sealant Primers for Porous Substrates: 775 g/L.
- C. Sheet Flashing: Manufacturer's standard unreinforced thermoplastic polyolefin sheet flashing, 55 mils thick, minimum, of same color as sheet membrane.
- D. Bonding Adhesive: Manufacturer's standard, water based.
- E. Slip Sheet: Manufacturer's standard, of thickness required for application.
- F. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
- G. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
- H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.3 SUBSTRATE BOARDS (Where indicated on drawings).

- A. Substrate Board:
 1. Fire-rated plywood, 3/4 inch thick.
 2. Densdeck, 5/8 inch thick.
- B. 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.

Fire-rated plywood, 3/4 inch thick.

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.

2.4 ROOF INSULATION

- A. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.
- B. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches unless otherwise indicated.
- C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

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2.5 INSULATION ACCESSORIES

A.

Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.

PART 3 - EXECUTION

3.1 SUBSTRATE BOARD (Where indicated on drawings):

- A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
- B. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturers' written instructions.

3.2 INSULATION INSTALLATION

- 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. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

3.3 ADHERED MEMBRANE ROOFING INSTALLATION

- A. Adhere membrane roofing over area to receive roofing and install according to membrane roofing system manufacturer's written instructions.
- B. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- C. Bonding Adhesive: Apply to substrate and underside of membrane roofing at rate required by manufacturer and allow to partially dry before installing membrane roofing. Do not apply to splice area of membrane roofing.
- D. In addition to adhering, mechanically fasten membrane roofing securely at terminations, penetrations, and perimeter of roofing.
- E. Apply membrane roofing with side laps shingled with slope of roof deck where possible.
- F. Seams:
 - 1. –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.
 - 2. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
 - 3. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
 - 4. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.

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3.4 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane 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 seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.5 FIELD QUALITY CONTROL

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
- B. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.

END OF SECTION 075423