
SECTION 07 56 00
FLUID-APPLIED MEMBRANE ROOFING - INSULATED

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes fluid-applied roof membrane system on insulated metal deck, consisting of the following:
1. Roof insulation and cover board.
 2. Base-ply sheet.
 3. Application of reinforced fluid-applied polyurethane roof membrane and membrane flashings.

1.2 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: For wood blocking, nailers and cants.
- B. Section 07 Section "Sheet Metal Flashing and Trim" for manufactured reglets, formed metal roof flashings, expansion joints, copings, and roof edge metal.
- C. Section 07 71 00 - Roof Specialties: For manufactured copings and roof edge metal.
- D. Division 07 Section "Manufactured Roof Expansion Joints."
- E. Division 22 Section "Storm Drainage Piping Specialties" for new or replacement roof drains.

1.3 ROOFING CONFERENCES

- A. Roofing Preinstallation Conference: Conduct conference at Project site. Review methods and procedures related to roofing system.
1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative if applicable, roofing materials manufacturer's representative, roofing Installer including project manager and foreman, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment requiring removal and replacement as part of the Work.
 2. Review methods and procedures related to preparation, including membrane roofing system manufacturer's written instructions.
 3. Review drawings and specifications.
 4. Review temporary protection requirements for existing roofing system that is to remain, during and after installation.
 5. Review roof drainage during each stage of roofing and review roof drain plugging and plug removal procedures.
 6. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 7. Review base flashings, special roofing details, drainage, penetrations, equipment curbs, and condition of other construction that will affect re-coating.
 8. Review HVAC shutdown and sealing of air intakes.
 9. Review shutdown of fire-suppression, -protection, and -alarm and -detection systems.
 10. Review procedures for asbestos removal or unexpected discovery of asbestos-containing materials.
 11. Review governing regulations and requirements for insurance and certificates if applicable.
 12. Review existing conditions that may require notification of Owner before proceeding.
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1.4 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D1079 "Standard Terminology Relating to Roofing and Waterproofing" and glossary in applicable edition of NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" for definition of terms related to roofing work in this Section.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product specified.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Provide roof plan showing orientation and types of roof deck and orientation of membrane roofing and fastening spacings and patterns for mechanically fastened components.
 - 1. Base flashings and terminations.
 - a. Indicate details meet requirements of NRCA and FMG required by this Section.
 - 2. Tapered insulation, including slopes.
 - 3. Crickets, saddles, and tapered edge strips, including slopes.
 - 4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
- C. Samples for Verification: For the following products:
 - 1. 8-by-10-inch (200-by-250 mm) square of fluid-applied membrane, and sheet materials.
 - 2. 8-by-10-inch (200-by-250 mm) square of roof insulation and cover board.
 - 3. Walkway pads.
 - 4. Six insulation fasteners of each type, length, and finish.

1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Product Certificate: Submit notarized certificate, indicating products intended for Work of this Section, including product names and numbers and manufacturers' names, with statement indicating that products to be provided meet the requirements of the Contract Documents.
- B. Qualification Data: For Installer, Manufacturer, and Roofing Inspector.
 - 1. Letter written for this Project indicating manufacturer approval of Installer to apply specified products and provide specified warranty.
 - 2. Certificate indicating Installer is qualified in Project jurisdiction to perform asbestos abatement.
- C. Warranties: Unexecuted sample copies of special warranties.
- D. Inspection Reports: Reports of Roofing Inspector. Include weather conditions, description of work performed, tests performed, defective work observed, and corrective actions required and carried out.
 - 1. Submit report within 48 hours after inspection.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: To include in maintenance manuals.
- B. Warranties: Executed copies of approved warranty forms.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and certified by manufacturer, including a full-time on-site supervisor with a minimum of five years' experience installing products comparable to those specified, able to communicate verbally with Contractor, Architect, and employees, and the following:
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1. Qualified by the manufacturer to install manufacturer's product and furnish warranty of type specified.
- B. Manufacturer Qualifications: Approved manufacturer listed in this Section, with minimum five years' experience in manufacture of specified products in successful use in similar applications.
 1. Approval of Other Manufacturers and Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
 - a. Product data, including certified independent test data indicating compliance with requirements.
 - b. Samples of each component.
 - c. Sample submittal from similar project.
 - d. Project references: Minimum of five installations of specified products not less than five years old, with Owner and Owner's Consultant contact information.
 - e. Sample warranty.
- C. Roofing Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article, to determine Installer's compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Roofing Inspector shall be one of the following:
 1. An authorized full-time technical employee of the manufacturer.
 2. An independent party certified as a Registered Roof Observer by the International Institute of Building Enclosure Consultants (formerly the Roof Consultants Institute) retained by the Contractor or the Manufacturer and approved by the Manufacturer.

1.9 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. Handle and store roofing materials, and place equipment in a manner to avoid significant or permanent damage to deck or structural supporting members.
- C. Protect materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting.

1.10 PROJECT / FIELD CONDITIONS

- A. Protect building, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from roofing operations.
 - B. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
 - C. Weather Limitations: Proceed with roofing work only when existing and forecasted weather conditions permit Work to proceed without water entering into existing roofing system or building.
 1. Store all materials prior to application at temperatures between 60 and 90 deg. F (16 and 32 deg C).
 2. Apply coatings within range of ambient and substrate temperatures recommended by manufacturer. Do not apply materials when air temperature is below 50 or above 110 deg. F (10 or above 43 deg C).
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3. Do not apply roofing in snow, rain, fog, or mist.
- D. Daily Protection: Coordinate installation of roofing so insulation and other components of roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
- E. Owner will occupy portions of building immediately below roofing area. Conduct roofing so Owner's operations will not be disrupted. Provide Owner with not less than 72 hours' notice of activities that may affect Owner's operations.

1.11 WARRANTY

- A. Manufacturer's Warranty: In which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within warranty period, as follows.
 1. Form of Warranty: Tremco "Plain and Simple" warranty form.
 2. Scope of Warranty: Work of this Section.
 3. Warranty Period: 25 years from date of completion.
 4. Inspections by Manufacturer: To occur every five years following completion.
- B. Installer Warranty: Installer's warranty signed by Installer, as follows.
 1. Form of Warranty: Form acceptable to Roofing Manufacturer and Owner.
 2. Scope of Warranty: Work of this Section.
 3. Warranty Period: 2 years from date of completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: The roof system specified in this Section is based upon products of Tremco CPG Inc, Beachwood, OH, (800) 562-2728, www.tremcoroofing.com that are named in other Part 2 articles. Provide specified products or comparable products of one of the following.
 1. Manufacturers of comparable products: Approved by Owner, Architect, or Owner's Consultant prior to bid.
- B. Source Limitations: Obtain components for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Provide roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.
 1. Accelerated Weathering: Roofing system 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/D3746M, ASTM D4272/D4272M, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
- C. Roofing System Design: Provide roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency in accordance with ANSI/FM 4474, UL 580, or UL

1897, and to resist uplift pressures.

- D. SPRI Wind Design Standard: Manufacture and install copings and roof edge flashings tested according to ANSI/SPRI ES-1.
- E. Flashings: Comply with requirements of Division 07 Sections "Sheet Metal Flashing and Trim" and "Manufactured Roof Specialties." Provide base flashings, perimeter flashings, detail flashings and component materials that comply with requirements and recommendations of the following:
 - 1. FMG 1-49 Loss Prevention Data Sheet for Perimeter Flashings.
 - 2. FMG 1-29 Loss Prevention Data Sheet for Above Deck Roof Components.
 - 3. NRCA Roofing Manual (Sixth Edition) for construction details and recommendations.
 - 4. SMACNA Architectural Sheet Metal Manual (Seventh Edition) for construction details.
- F. Exterior Fire-Test Exposure: ASTM E108, 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.
- G. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
 - 2. Identify products with appropriate markings of applicable testing agency.

2.3 MATERIALS

- A. General: Roofing materials recommended by roofing system manufacturer for intended use and compatible with components of existing membrane roofing system.
- B. Temporary Roofing Materials: Selection of materials and design of temporary roofing is responsibility of Contractor.
- C. General: Provide adhesive and sealant materials recommended by roofing manufacturer for intended use and compatible with built-up roofing.
 - 1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

2.4 SHEET MATERIALS

- A. Base-Ply Sheet:
 - 1. SBS-modified asphalt coated composite polyester / fiberglass/fiberglass mat reinforced high tensile strength base sheet, ASTM D4601 Type II.
 - a. Basis of design product: Tremco, BURmastic Composite Ply HT.
 - b. Tensile Strength at 77 deg. F (25 deg. C), minimum, ASTM D5147: Machine direction, 165 lbf/in (725 N); Cross machine direction, 150 lbf/in (660 N).
 - c. Tear Strength at 77 deg. F (25 deg. C), minimum, ASTM D5147: Machine direction, 260 lbf (1150 N); Cross machine direction, 230 lbf (1120 N).
 - d. Thickness, minimum, ASTM D5147: 0.060 inch (1.5 mm).
- B. Flashing Base-Ply Sheet: Same product as base-ply sheet.

2.5 FLUID-APPLIED ROOFING MEMBRANE

- A. Polyurethane Elastomeric Fluid-Applied System: Two-coat reinforced fluid-applied roofing membrane formulated for application over prepared existing roofing substrate.
 - 1. Base Coat:

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- a. Polyurethane Roof Coating System Base Coat: Single-part moisture-curing, for use with a compatible top coat.
 - 1) Basis of design product: Tremco, AlphaGuard MTS Base Coat.
 - 2) Combustion Characteristics, UL790: Maintains combustion characteristics of existing roof system.
 - 3) Volatile Organic Compounds (VOC), maximum, ASTM D3960: 42 g/L.
 - 4) Accelerated Weathering, 5000 hours, ASTM G154: Pass.
 - 5) Hardness, Shore A, minimum, ASTM D2240: 85.
 - 6) Solids, by volume, ASTM D2697, minimum: 87 percent.
 - 7) Minimum Thickness, Base Coat on Smooth Surface: 48 mils (1.22 mm) wet.
 2. Top Coat:
 - a. Polyurethane roof coating system top coat, low odor, low VOC, single-part, for application over compatible base coat.
 - 1) Basis of design product: Tremco, AlphaGuard MTS Top Coat.
 - 2) Combustion Characteristics, UL790: Maintains combustion characteristics of existing roof system.
 - 3) Volatile Organic Compounds (VOC), maximum, ASTM D3960: 44 g/L.
 - 4) Solar Reflectance Index (SRI), ASTM E1980: For white, not less than 108.
 - 5) Accelerated Weathering, 5000 hours, ASTM G154: Pass.
 - 6) Hardness, Shore A, minimum, ASTM D2240: 85.
 - 7) Solids, by volume, ASTM D2697: 87.
 - 8) Minimum Thickness: 32 mils (0.81 mm) wet over cured base coat.
 - 9) Minimum Thickness, Slip-Resistant Coat: 20 mils (0.50 mm) wet.
 - 10) Color: White.
 3. Reinforcing Fabric:
 - a. Polyester Reinforcing and Protection Fabric: 100 percent stitch-bonded mildew-resistant polyester fabric intended for reinforcement of compatible fluid-applied membranes and flashings and as a protection layer under pavers or stone aggregates.
 - 1) Basis of design product: Tremco, Permafab.
 - 2) Tensile Strength, Minimum, ASTM D1682: 50 lbf (23 kg) avg.
 - 3) Elongation, Minimum, ASTM D1682: 60 percent.
 - 4) Tear Strength, Minimum, ASTM D1117: 16 lbf (7.3 kg) avg.
 - 5) Weight: 3 oz./sq. yd (102 g/sq. m).
 4. Primers:
 - a. Primer for Asphaltic and Single-Ply Membranes: Water-based, polymer-modified quick-dry low odor primer.
 - 1) Basis of design product: Tremco, AlphaGuard WB Primer.
 - 2) Volatile Organic Compounds (VOC), maximum, ASTM D3960: 1 g/L.
 - 3) Solids, by weight: 70 percent.
 - b. Primer for Masonry Surfaces: Two-part high-solids epoxy-penetrating low-odor primer for masonry and concrete surfaces.
 - 1) Basis of design product: Tremco, AlphaGuard C-Prime.
 - 2) Volatile Organic Compounds (VOC), maximum, ASTM D3960: 0 g/L.
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- 3) Solids, by weight: 100 percent.
- c. Primer for Non-Porous Surfaces: Single-part, water-based primer to promote adhesion of urethanes to metals, PVC and other non-porous surfaces.
 - 1) Basis of design product: Tremco, AlphaGuard M-Prime.
 - 2) Volatile Organic Compounds (VOC), maximum, ASTM D3960: 22 g/L.
 - 3) Nonvolatile Content, minimum, ASTM D2369: 5 percent.
 - 4) Density at 77 deg F (25 deg C): 8.3 lb/gal (1kg/L).
- d. Primer for Intercoat and Substrate Adhesion: Single-part, quick-drying primer to promote adhesion of urethane products to previous urethane coats and to other approved surfaces.
 - 1) Basis of design product: Tremco, Geogard Primer.
 - 2) Volatile Organic Compounds (VOC), maximum, ASTM D3960: 100 g/L.
 - 3) Coverage Rate, 400 sq. ft/ gal. (10 m2/ L): 4 mils (0.10 mm) wet.

2.6 ADHESIVE MATERIALS

- A. Base-Ply Sheet Adhesive:
 - 1. Cold-applied bio-based low odor urethane roofing adhesive, two-part, USDA BioPreferred, formulated for compatibility and use with specified roofing membranes and flashings.
 - a. Basis of design product: Tremco, POWERply Endure BIO Adhesive TF.
 - b. Volatile Organic Compounds (VOC), maximum, ASTM D3690: 0 g/L.
 - c. Low Temperature Flexibility, ASTM D2240: Pass at -30 deg F (-34 deg C).
 - d. Solids, by Volume, ASTM D2697: 100 percent.
 - e. Biobased Content, Minimum, ASTM D6866: 70 percent.
- B. Flashing Base-Ply Sheet Adhesive: Same product as base-ply sheet adhesive.

2.7 AUXILIARY ROOFING MEMBRANE MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with existing roofing system and fluid-applied roofing system.
- B. Joint Sealant: Elastomeric joint sealant compatible with applied coating, with movement capability appropriate for application.
 - 1. Joint Sealant, Polyurethane: ASTM C920, Type S, Grade NS, Class 50 single-component moisture curing sealant, formulated for compatibility and use in dynamic and static joints; paintable.
 - a. Basis of design product: Tremco, TremSEAL Pro.
 - b. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 40 g/L.
 - c. Hardness, Shore A, ASTM C661: 40.
 - d. Adhesion to Concrete, ASTM C794: 35 pli.
 - e. Tensile Strength, ASTM D412: 350 psi (2410 kPa).
 - f. Color: Closest match to substrate.
- C. Stripping Adhesive / Sealer:
 - 1. Seam Sealer: Aromatic polyurethane sealer, single-component, high solids, moisture curing, formulated for compatibility and use with a variety of roofing and flashing substrates.
 - a. Basis of design product: Tremco, GEOGARD Seam Sealer.
 - b. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 189 g/L.
 - c. Tensile Strength, ASTM D412: 270 psi (1860 kPa).
 - d. Tear Strength, ASTM D412: 35 pli (6.13 kNm).

- e. Elongation, ASTM D412: 220 percent.
 - f. Color: Gray.
- D. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer.

2.8 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.
 - 1. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48) unless otherwise indicated.
 - 2. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated, not less than two times the roof slope.
- B. Roof Insulation:
 - 1. Board Insulation, Polyisocyanurate: CFC- and HCFC- free, with recycled content glass-fiber mat facer on both major surfaces, ASTM C1289 Type II Class 1.
 - a. Basis of design product: Tremco, Trisotech Insulation.
 - b. Compressive Strength, ASTM D1621: Grade 2: 20 psi (138 kPa).
 - c. Conditioned Thermal Resistance at 75 deg. F (24 deg. C): 14.4 at 2.5 inches (50.8 mm) thick.

2.9 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with built-up roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FM Global 4470, designed for fastening roof insulation to substrate and acceptable to roofing manufacturer.
- C. Roof Insulation Adhesive:
 - 1. Urethane adhesive, bead-applied, low-rise two-component solvent-free low odor, formulated to adhere roof insulation to substrate.
 - a. Basis of design product: Tremco, Low Rise Foam Insulation Adhesive.
 - b. Flame Spread Index, ASTM E84: 10.
 - c. Smoke Developed Index, ASTM E84: 30.
 - d. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 0 g/L.
 - e. Tensile Strength, minimum, ASTM D412: 250 psi (1720 kPa).
 - f. Peel Adhesion, minimum, ASTM D903: 17 lbf/in (2.50 kN/m).
 - g. Flexibility, 70 deg. F (39 deg. C), ASTM D816: Pass.
- D. Insulation Cant Strips: ASTM C208, Type II, Grade 1, cellulosic-fiber insulation board.
- E. Wood Cant Strips: Comply with requirements in Division 06 rough carpentry section.
- F. Tapered Edge Strips: ASTM C208, Type II, Grade 1, cellulosic-fiber insulation board.

2.10 COVER BOARD:

- A. Gypsum panel, cellulosic fiber reinforced, water-resistant, ASTM C1278/C1278M.
 - 1. Basis of design product: Tremco/USG Securock.
 - 2. Thickness: 1/2 inch (13 mm).

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- B. Substrate Joint Tape: 6- or 8-inch- (150- or 200-mm-) wide, coated, glass fiber.

2.11 WALKWAYS

A. Walkway Materials:

1. Polyurethane Top Coat, Slip-Resistant: Second top coat with broadcast slip-resistant aggregate.
 - a. Basis of design product: Tremco, AlphaGuard Top Coat Slip-Resistant.
 - b. Minimum Thickness: As indicated in Part 2 product listing; over cured top coat.
 - c. Silica sand aggregate: 20 to 30 lb/100 sq. ft.
 - d. Color: As selected from manufacturer's standard colors.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
1. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
 2. Verify that, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation. wood cants
 3. Metal Deck:
 - a. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Division 05 Section "Steel Decking."
 - b. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch (1.6 mm) out of plane relative to adjoining deck.
- B. Proceed with installation once unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing manufacturer's written instructions. Remove sharp projections.
- B. Protect existing roofing system that is indicated to remain, and adjacent portions of building and building equipment.
1. Comply with warranty requirements of existing roof membrane manufacturer. for tie-in of new roofing to existing roofing.
 2. Mask surfaces to be protected. Seal joints subject to infiltration by coating materials.
 3. Limit traffic and material storage to areas of existing roofing membrane that have been protected.
 4. Maintain temporary protection and leave in place until replacement roofing has been completed.
- C. Shut down air intake equipment in the vicinity of the Work in coordination with the Owner. Cover air intake louvers before proceeding with re-coating work that could affect indoor air quality or activate smoke detectors in the ductwork.
1. Verify that rooftop utilities and service piping affected by the Work have been shut off before commencing Work.
- D. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday. Prevent debris from entering or blocking roof drains and conductors. Use roof-drain plugs specifically designed for this purpose. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.
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1. Do not permit water to enter into or under existing membrane roofing system components that are to remain.

3.3 MEMBRANE ROOFING INSTALLATION, GENERAL

- A. Install roofing membrane according to roofing manufacturer's written instructions.
 1. Commence installation of roofing in presence of manufacturer's technical personnel.
- B. Coordinate installation of roofing so insulation and other components of roofing not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
 1. Provide tie-offs at end of each day's work to cover exposed roofing sheets and insulation with a course of coated felt set in roofing cement with joints and edges sealed.
 2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing.
 3. Remove and discard temporary seals before beginning work on adjoining roofing.
- C. Substrate-Joint Penetrations: Prevent fluid-applied materials and adhesives from penetrating substrate joints, entering building, or damaging built-up roofing components or adjacent building construction.

3.4 INSULATION INSTALLATION

- A. Comply with roofing manufacturer's written instructions for installing roof insulation.
- B. Coordinate installing membrane roofing system components, so insulation is not exposed to precipitation or left exposed at the end of the workday.
- C. Tapered Insulation and Crickets: Install tapered insulation under area of roofing to conform to slopes indicated.
 1. Where saddles or crickets are indicated or required to provide positive slope to drain, make slope of crickets minimum of two times the roof slope.
- D. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
 1. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
- E. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches (70 mm) or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.
 1. Flat Insulation System on Sloped Roof Deck: Install insulation at minimum thickness as follows:
 - a. Minimum total thickness of Continuous Insulation: 5.2 inches.
 - 1) Minimum thickness of base layer: 2.6 inches.
 - 2) Minimum thickness of each subsequent layer: 2.6 inches.
 - b. Minimum Continuous Insulation R-value: Not less than 30.
 2. Tapered Insulation System for Flat Roof Deck: Install insulation as follows:
 - a. Minimum total thickness of Continuous Insulation: 5.2 inches.
 - 1) Minimum thickness of base layer: 2.6 inches.
 - 2) Minimum thickness of each subsequent layer: 2.6 inches.
 - b. Minimum Continuous Insulation R-value: Not less than 30.
 3. Insulation Drain Sumps: Tapered insulation sumps, not less than 2 by 2 ft (600 by 600 mm), sloped to roof drain; sump to maximum depth of not more than 1 inch (25 mm) less than the Project-

stipulated continuous insulation thickness based upon code requirements.

- F. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- G. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- H. Mechanically Fastened Insulation: 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.
 - 1. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
- I. 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. Loosely butt cover boards together.
 - 1. Set cover board in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining cover in place.

3.5 BASE-PLY SHEET INSTALLATION

- A. Install base sheet starting at low point of roofing. Align base sheet without stretching. Shingle side laps of base a minimum of 4 inches (100 mm). Shingle in direction to shed water. Extend base sheets over edges and terminate above cants.
 - 1. Embed base sheet in cold-applied membrane adhesive applied at rate required by roofing manufacturer.
- B. Extend base flashing up walls or parapets a minimum of 8 inches (200 mm) above roofing and 6 inches (150 mm) onto field of roofing.
- C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
 - 1. Seal top termination of base flashing with a metal termination bar.
- D. Install stripping according to roofing manufacturer's written instructions where metal flanges and edgings are set on roofing.
 - 1. Flashing Sheet Stripping: Install flashing sheet stripping in specified cold adhesive and extend onto roofing membrane.
- E. Roof Drains: Install base-ply sheet in cold adhesive around drain bowl. Base sheet must be installed so that it will be under compression from the clamping ring. Install base coat, fabric reinforcement, and top coat over base sheet. Install drain clamping ring and strainer.

3.6 FLUID-APPLIED FLASHING APPLICATION

- A. Fluid-Applied Flashing and Detail Base Coat Application: Complete base coat and fabric reinforcement at parapets, curbs, penetrations, and drains prior to application of field of fluid-applied membrane. Apply base coat in accordance with manufacturer's written instructions.
 - 1. Extend coating minimum of 8 inches (200 mm) up vertical surfaces and 4 inches onto horizontal surfaces.
 - 2. Back roll to achieve minimum coating thickness indicated on Part 2 product listing, unless greater thickness is recommended by manufacturer; verify thickness of base coat as work progresses.
 - 3. Reinforcing Fabric: Embed fabric reinforcement into wet base coat. Lap adjacent flashing pieces of fabric minimum 3 inches (75 mm) along edges and 6 inches (150 mm) at end laps.
 - a. Roll surface of fabric reinforcing to completely embed and saturate fabric. Leave finished base coat with fabric free of pin holes, voids, or openings.

4. Roll surface of fabric reinforcing to completely embed and saturate fabric. Leave finished base coat with fabric free of pin holes, voids, or openings.
5. Roof Drains: Set 30 by 30 inch (760 by 760 mm) square metal flashing in bed of compatible mastic/adhesive sealer on roofing base-ply sheet. Cover metal flashing with stripping ply and extend a minimum of 6 inches (150 mm) beyond edge of metal flashing. Allow to cure.
 - a. Apply base coat and immediately install target piece of fabric reinforcement into wet base coat, extend into drain bowl and roll to fully embed and saturate fabric. Apply top coat after base coat has cured.
 - b. Following application and curing of fluid-applied roofing membrane, install clamping ring and strainer.
6. Allow base coat to cure prior to application of top coat.

3.7 FLUID-APPLIED MEMBRANE APPLICATION

- A. Base Coat: Apply base coat to field of membrane in accordance with manufacturer's written instructions.
 1. Apply base coat on prepared and primed surfaces and spread coating evenly.
 2. Back roll to achieve minimum coating thickness indicated on Part 2 product listing, unless greater thickness is recommended by manufacturer; verify thickness of base coat as work progresses.
 3. Reinforcing Fabric: Embed fabric reinforcement into wet base coat. Lap adjacent flashing pieces of fabric minimum 3 inches (75 mm) along edges and 6 inches (150 mm) at end laps.
 - a. Roll surface of fabric reinforcing to completely embed and saturate fabric. Leave finished base coat with fabric free of pin holes, voids, or openings.
 4. Roll surface of fabric reinforcing to completely embed and saturate fabric. Leave finished base coat with fabric free of pin holes, voids, or openings.
 5. Allow base coat to cure prior to application of top coat.
- B. Top Coat: Apply top coat to field of membrane and flashings uniformly in a complete, continuous installation.
 1. Prime base coat prior to application of top coat if top coat is not applied within 72 hours of the base coat application, using manufacturer's recommended primer.
 2. Apply top coat extending coating up vertical surfaces and out onto horizontal surfaces. Install top coat over field base coat and spread coating evenly.
 3. Back roll to achieve minimum coating thickness indicated on Part 2 product listing, unless greater thickness is recommended by manufacturer; verify thickness of base coat as work progresses.
 4. Avoid foot traffic on new fluid-applied membrane for a minimum of 24 hours.

3.8 WALKWAY INSTALLATION

- A. Walkways, General: Install walkways according to roofing manufacturer's written instructions.
 1. Install walkways at following locations:
 - a. Where indicated on Drawings.
 - b. Perimeter of each rooftop unit.
 - c. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
 - d. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.

- e. Top and bottom of each roof access ladder.
 - f. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
- B. Slip-Resistant Walkway Topcoat: Apply walkway second topcoat following application and curing of top coat. Locate as indicated on Drawings.
 - 1. Mask walkway location with tape.
 - 2. Prime first top coat prior to application of walkway top coat if walkway top coat is not applied within 72 hours of the first top coat application, using manufacturer's recommended primer.
 - 3. Apply walkway topcoat and back roll to achieve minimum coating thickness indicated on Part 2 product listing, unless greater thickness is recommended by manufacturer; verify thickness of base coat as work progresses.
 - 4. Broadcast Slip-Resistant Top Coat Aggregate in wet top coat at rate indicated in Part 2 product listing or as otherwise recommended by coating manufacturer.
 - a. Back roll aggregate and top coat creating even dispersal of aggregate.
 - 5. Remove masking immediately.

3.9 FIELD QUALITY CONTROL

- A. Roofing Inspector: Contractor shall engage a qualified roofing inspector for a minimum of 2 full-time days on site, per 40-hour crew week, to perform roof tests and inspections and to prepare start up, interim, and final reports. Roofing Inspector's quality assurance inspections shall comply with criteria established in Quality Control and Quality-assurance Guidelines for the Application of Membrane Roof Systems."
- B. Roof Inspection: Contractor shall engage roofing system manufacturer's technical personnel to inspect roofing installation, and submit report to the Owner and Architect. Notify Owner and Architect 48 hours in advance of dates and times of inspections. Inspect work as follows:
 - 1. Upon completion of preparation of first component of work, prior to application of re-coating materials.
 - 2. Following application of re-coating to flashings and application of base coat to field of roof.
 - 3. Upon completion of re-coating but prior to re-installation of other roofing components.
- C. Repair fluid-applied membrane where test inspections indicate that they do not comply with specified requirements.
- D. Arrange for additional inspections, at Contractor's expense, to verify compliance of replaced or additional work with specified requirements.

3.10 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period.
- B. Correct deficiencies in or remove coating that does not comply with requirements, repair substrates, and reapply coating.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 56 00