

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 07140 – FLUID-APPLIED MEMBRANE WATERPROOFING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. The General Provisions of the contract, including the General Provisions for Construction Projects (2016), Special Provisions, and General Requirements of the Specifications, apply to the work specified in this Section.

1.02 SUMMARY

- A. Provide a cold fluid-applied bitumen-modified polyurethane waterproofing system on structural concrete and metal drain inlets.
 - 1. Work includes substrate preparation.
 - 2. Work includes bridging and sealing air leakage and water intrusion pathways and gaps including connections of the slabs and walls to the penetrations, drains etc.
- B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
 - 1. Section 03300 – STRUCTURAL CONCRETE

1.03 PERFORMANCE REQUIREMENTS

- A. Cold fluid applied bitumen-modified polyurethane waterproofing system is intended to perform as a continuous barrier against liquid water, waste water and aqueous chemicals. Membrane system is UV stable and is intended to be exposed, submerged or to receive an overburden of concrete, tile in a cementitious setting bed, pavers in a sand setting bed, pavers on supporting pedestals, or soil/growing media, and shall accommodate movements of building materials as required with a separate detail coat done by itself reinforced with polyester fabric or accessory sealant materials at locations such as: changes in substrate, perimeter conditions and penetrations. Installed waterproofing membrane system shall not permit the passage of water, and will withstand the design pressures calculated in accordance with the most current revision of ASCE 7.
- B. Manufacturer shall provide all primary waterproofing materials that are physically and chemically compatible when installed in accordance with manufacturers current application requirements.

1.04 SUBMITTALS

- A. Submittals: Comply with project requirements for submittals as specified in Section 01300 – SUBMITTALS.
- B. Product Data: For each product listed in Part 2 – PRODUCTS.
- C. Shop Drawings: Manufacturer's standard details and shop drawings for the specified system.
- D. Installer's Authorization: Installer shall provide written documentation from the manufacturer of their authorization to install the 20-year system, and eligibility to obtain the warranty specified in this section.
- E. Manufacturer' Certification: Certification showing full time quality control of production facilities and that each batch of material is tested to ensure conformance with the manufacturer's published physical properties.
- F. VOC Certification: Manufacturer's certification that all waterproofing system products meet current Volatile Organic Compound (VOC) regulations as established by the State in which they are being installed; and stating total VOC content, in grams per liter, for all system components (i.e. primers, adhesives, coatings, etc.).

1.05 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Manufacturer shall demonstrate qualifications to supply materials of this section by certifying the following:
 - 1. Membrane Manufacturer shall have available an in-house technical staff to assist the contractor when necessary in the application of the products and site review of the assembly.
- B. Installer's Qualifications: The Contractor shall demonstrate qualifications to perform the Work of this Section by submitting certification or license by the waterproofing membrane manufacturer as a trained and authorized applicator of the product the installer intends to use.
- C. Source Limitations: All components listed in this section shall be provided by a single manufacturer or approved by the primary waterproofing manufacturer.
- D. Materials Compatibility: All materials included in the waterproofing assembly, as well as associated materials adhered to/applied beneath the waterproofing membrane shall have been tested and verified to be compatible within waterproofing Mock-Up. Include written testing documentation and test reports.
 - 1. Testing shall be conducted via Peel Strength Test as follows:

- a. Prepare surface and existing coating as proposed for the project.
 - b. Apply waterproofing primer and allow to cure until tack free.
 - c. Prepare three (3) 12" long strips of 6" wide reinforcing fabric. A 6" length of the reinforcing fabric strip will be saturated with coating, with 6" left unsaturated to allow for attachment to the test scale.
 - d. Apply Base or Top Coat as proposed for project at wet mil thickness sufficient to allow saturation of reinforcing fabric. Fully saturate an 8" length of reinforcing fabric with coating. Allow two component coatings to cure for 3 days. DO NOT seed with aggregate.
 - e. Score through each adhered reinforcing fabric sample and through the existing coating down to the underlying substrate to create a 1" wide test strip. Cut the loose fabric as well.
 - f. Attach a tarp clip to the loose end of each test strip. Hook a digital scale to the tarp clip. Apply a 180° load until strip peels off.
 - g. A test result of 8 pounds per linear inch is considered acceptable.
2. See Section 01433 – MOCK-UPS for waterproofing mock-up requirements.
- E. Applicable Regulations: Comply with local code and requirements of authorities having jurisdiction. Do not exceed VOC regulations as established by the State in which they are being installed; including total VOC content, in grams per liter, for all system components (i.e. primers, adhesives, coatings, and similar items).

1.06 PRE-INSTALLATION CONFERENCE

- A. Prior to scheduled commencement of the waterproofing installation and associated work, conduct a meeting at the project site with the installer, DOT-A, manufacturer's representative and any other persons directly involved with the performance of the Work. The Installer shall record conference discussions and to include decisions and agreements reached (or disagreements), and furnish copies of recorded discussions to each attending party. The main purpose of this meeting is to review foreseeable methods and procedures related to the Work.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver all waterproofing materials to the site in original containers, with factory seals intact.

- B. Store all pail goods in their original undamaged containers in a clean, dry location within their specified temperature range.
- C. Do not expose materials to moisture in any form before, during, or after delivery to the site. Reject delivery of materials that show evidence of contact with moisture.
- D. Remove manufacturer supplied plastic covers from materials provided with such. Use “breathable” type covers such as canvas tarpaulins to allow venting and protection from weather and moisture. Cover and protect materials at the end of each work day. Do not remove any protective tarpaulins until immediately before the material will be installed.
- E. Materials shall be stored above 60-90°F (15-30°C) a minimum of 24 hours prior to application.

1.08 PROJECT CONDITIONS

- A. Weather: Proceed with waterproofing only when existing and forecasted weather conditions permit. Membrane application should not proceed when precipitation is imminent. Ambient temperatures shall be above 36°F (2°C) when applying the waterproofing system.
- B. All surfaces to receive the waterproofing membrane shall be free from visible water, dew, frost, snow and ice. Application of waterproofing membrane shall be conducted in well ventilated areas.
- C. Minimum age of concrete must be 21-28 days depending on curing and drying conditions.
- D. Waterproofing Membrane:
 - 1. Waterproofing membrane is not intended to be exposed or in contact with a constant temperature below -25°F (-31.7°C) or in excess of 200°F (93.3°C).
 - 2. Specified waterproofing membrane is VOC compliant. Consult container, packaging labels and Safety Data Sheets (SDS) for specific safety information.
 - 3. Some low molecular weight alcohols can soften. Any exposure to foreign materials or chemical discharges shall be presented to membrane manufacturer for evaluation to determine any impact on the waterproof membrane assembly performance prior to warranty issuance.
- E. Contractor shall ensure adequate protection during installation of the waterproofing system.

1.09 WARRANTY

- A. Warranty: Provide manufacturer's standard warranty. Materials warranty shall be for a minimum of one year starting at the date of Substantial Completion. System warranty shall be for the following duration in accordance with specified system.

1. Warranty Length: 20 years 120 mil system and approved applicator.

PART 2 – PRODUCTS

2.01 WATERPROOFING SYSTEM

- A. Fluid-Applied Membrane System, 20 Year System:
1. 120 mils wet film thickness resulting in 12 SF/gal coverage (3 coats each 40 mils)
 2. Reinforcing fabric recommended for moving transitions such as transitions between dissimilar materials, corners, penetrations, seams, joints and cracks. The fabric is embedded into a separate 30 mils detail coat underneath of the first coat.

2.02 MEMBRANES AND COATINGS

- A. Detail coat shall be a two component, cold fluid applied, chemical cure, bitumen modified, polyurethane detail coat membrane.
1. Base coat shall be a two component, cold fluid applied, chemical cure, bitumen modified, polyurethane base coat membrane.
 2. Top coat shall be a two component, cold fluid applied, chemical cure, bitumen modified, polyurethane top coat membrane.
- B. Base coat and top coat membranes shall be low in VOC's, and be a two component elastomeric polyurethane membrane that may be brush or roller applied. Membrane shall have the following physical properties and conforms to ASTM D7311-07: Standard Specification for a single component, cold fluid applied, moisture cure, bitumen modified, polyurethane membranes.
- C. Liquid and Cured Film Property Requirements:
1. Standard Measurement / Grade
 2. ASTM D-624, Die C: Tear Resistance (psi) 150 ± 50
 3. ASTM D-412: Elongation at Break (%) 450 ± 50
 4. ASTM D-412: Tensile Strength (pli) 850 ± 50

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| 5. | ASTM D-2240: Hardness (Shore A) | 60 ± 5 |
| 6. | ASTM D-2697: Total Volume Solids (%) | 89 ± 2 |
| 7. | ASTM D-236: Total Weight Solids (%) | 95 ± 2 |
| 8. | ASTM D-2369-81: VOCs (g/l) | 78 |
| 9. | ASTM D-751: Permeability to water vapor (perms) | 0.06 |
| 10. | Specific Gravity (lbs/gal) | 8.30 |

2.03 MEMBRANE REINFORCEMENT – POLYESTER

- A. Reinforcement for the waterproofing membrane system shall be stitch bonded polyester fabric designed to provide greater impact resistance and greater resistance to excessive thermal and structural movement while maintaining elasticity and membrane film integrity.
- B. Supplemental reinforcement of the waterproofing membrane system shall be, a nylon mesh specifically designed for local reinforcement of the waterproofing membrane at structural cracks, expansion joints and transitions between dissimilar materials.

2.04 FILLET BEAD AND PENETRATION SEALANT

- A. Sealant for fillet bead applications and membrane penetrations shall be, one and two part polyurethane sealants suitable for fillet bead transition compound to be applied prior to the installation of the membrane system at changes in substrate direction, sealing reglet terminations, cracks in the substrate and penetrations of the waterproofing system. Cold fluid applied polyurethane waterproofing itself shall be applied as thick strip coat can be also used as transition compound to be applied prior to the installation of the membrane system.

2.05 PRIMERS

- A. Primer shall have capabilities to avoid pinholing and improve adhesion over concrete substrate which has an open texture or over metallic substrates.

2.06 REPAIR AND PATCHING

- A. Cementitious repair mortar to repair bug holes, and other non-structural surface defects, to fill uneven areas and birdbaths, or to repitch decks shall be a two component, polymer-modified, Portland cement, fast-setting, trowel-grade mortar.

2.07 DRAINAGE MAT

- A. Geonet polypropylene composite drainage mat with a non-woven polypropylene filter fabric bonded to the topside of the mat, and a bonded protection sheet on the underside of the mat. To be installed between the waterproofing membrane and extruded polystyrene insulation or topping slab.

2.08 SPRAY EQUIPMENT

- A. Spray Pumps: Use spray pumps as recommended by waterproofing manufacturer.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and conditions are ready to accept the Work of this section. Notify DOT-A in writing of any discrepancies. Commencement of the Work in an area shall mean Installer's acceptance of the substrate.
- B. Surfaces shall be sound, clean and free of standing water, oil, grease, dirt, excess mortar or other contaminants. Fill voids and gaps in substrate to provide an even plane.

3.02 SURFACE PREPARATION

- A. Verify that the surface is clean and smooth, free of depressions, waves, or projections, and properly sloped to drains. Verify that all openings or penetrations through the intended substrate are secured back to solid blocking. Ensure all preparatory Work is complete prior to applying membrane.
- B. All surfaces shall be blown clean using an air compressor to remove any remaining loose debris.
- C. All cracks and voids greater than 1/16 inch shall be routed and troweled with cold fluid applied waterproofing or caulked with Sikaflex sealant. Allow to cure per waterproofing membrane manufacturer's technical data sheets prior to over-coating with the specified waterproofing membrane system.
- D. At all inside corners, gaps or voids at the juncture of the deck and penetrations apply a minimum 3/4 inch fillet bead of sealant or cold fluid applied waterproofing and allow to cure per waterproofing membrane manufacturer's technical data sheets prior to installing the waterproofing membrane system.
- E. Membrane is self-terminating but membrane terminations can be established prior to project start-up and documented in shop drawings. Terminations can occur in raked-out mortar joints, saw cut terminations or under installed counter-flashing materials.

- F. Use tape lines to achieve a straight edge detail.

3.03 SUBSTRATE PREPARATION

A. Structural Concrete:

1. Acceptable concrete substrates are limited to poured in place concrete slabs.
2. It is common for decontamination to precede mechanical preparation.
3. Minimum slab thickness for structural concrete is 4 inches (10.2 cm).
4. The preferred methods for creation of a surface profile, including the removal of dirt, dust, laitance and curing compounds, is steel shotblasting, abrasive sand blasting or scarifying.
5. Curing agents shall be checked for compatibility with specified waterproofing materials. Most curing agents shall be completely removed from the substrate by grinding, scarifying, or other mechanical means.
6. Concrete and masonry surfaces shall be low-pressure (5,000 psi or less) power-washed in accordance with ICRI Guideline No. 03732: Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays to remove all dirt, debris or surface contamination that would compromise bonding of the specified waterproofing membrane system. Remove oil or grease with solvents, or detergent and water. Rinse surface clean of remaining cleaning agents.
7. Vertical and overhead surfaces, such as wall and ceiling surfaces shall be prepared utilizing methods of grinding, scarifying, abrasive sand blasting, needle scaling, high pressure water jetting (5000 – 45,000 psi = 400 – 3000 bar) or vertical steel shotblasting. The use of high-pressure water jetting will introduce large amounts of water, which may contribute to moisture related problems.

B. Metal Surfaces:

1. Exposed drain bowls, pipes, and other metal surfaces shall be cleaned by power tool cleaning (SSPC SP-3) to remove corrosion deposits back to a clean, bright metal followed by a solvent wipe prior to application of the specified primer.

3.04 PRIMING

A. Metal

1. Apply primer for metal surfaces. To clean and prepared drain bowls and other metal surfaces by brush or roller at the application rate shown on the technical data sheet to achieve an overall wet film thickness of 8 mils. High porosity and roughness of the substrate will decrease coverage rates.
2. Allow to cure and dry in accordance with manufacturer's technical data sheets.

B. PVC

1. Apply primer to clean and prepared PVC surfaces by brush or roller at the application rate of 100-150 SF/gal.
2. Allow to cure and dry in accordance with manufacturer's technical data sheets.

3.05 MEMBRANE REINFORCEMENT

A. Reinforcement of Cracks, Plywood and Cover Board Joints/Seams, and Base/Curb Flashing Transitions:

1. For all locations where the specified membrane system is to be applied directly to the substrate surface, reinforcement of cracks and joints prior to applying the specified membrane system is conditional on the terms agreed to in a given warranty
2. Back roll reinforcement to fully embed reinforcement into the wet liquid polyurethane detail coat. Add more liquid membrane as needed to fully embed the reinforcement and to achieve 30 WFT
3. Ensure reinforcement is not in tension during embedment.

3.06 COLD FLUID APPLIED MEMBRANE APPLICATION

- A. Install waterproofing membrane system in accordance with current technical data sheets and in accordance with warranty guideline requirements.
- B. Apply strip coat or detail coat with brush.
- C. Immediately lay specified conformable reinforcement into the wet base embedment resin coat

- D. Apply pressure to the membrane reinforcement with a roller as appropriate to fully embed and saturate the membrane reinforcement into liquid waterproofing material. Remove air pockets from under the membrane by rolling them out.
- E. Apply additional liquid material as required to ensure desired millage and the membrane reinforcement is fully embedded and has conformed to the substrate without tenting or visible pinholes.
- F. Apply base coat to horizontal deck and vertical wall surfaces with 1/2 inch – 3/4 inch phenolic core roller to achieve a continuous and uniform minimum wet film thicknesses as specified in warranty guideline requirements. Brush can be used to apply strip coat or detail coat prior to the first waterproofing layer.
- G. Overlap sheets of scrim reinforcement 3 inches at side laps and 6 inches at end laps.
- H. Extend reinforcement vertically at adjacent wall surfaces in accordance with project details and specifications.
- I. Apply top coat by phenolic core roller to achieve a continuous and uniform minimum wet film thickness as specified in warranty guideline requirements.

3.07 DRAINS

- A. Clean, prepare and prime surfaces ready to receive membrane applications. Block drain bowl opening to avoid waterproofing material from entering the drainage system.
- B. Remove strainer baskets and clamping rings from the drain bowl assembly. Temporarily replace the bolts back into assembly to avoid miss-alignment of connections after membrane applications are completed.
- C. Extend the liquid waterproofing material and membrane reinforcement directly into the throat of the prepared drain.
- D. Remove drain blocks and allow the waterproofing system to fully cure dry prior to re-connecting the drain bowl assembly.

3.08 FLOOD TEST

- A. Upon the completion of the waterproofing membrane system and associated terminations the contractor shall flood test the system. Provide temporary stops and plugs for the drains within the test area. Flood test with a minimum 2 inches of water for no less than 24 hours.

- B. Repair and retest the system for no less than 24 hours, report all deficiencies to DOT-A. Remove temporary stops and plugs. No other Work is to proceed without prior direction from DOT-A.

3.09 PROTECTION

- A. Protect waterproofing Work from other trades until completion.
- B. Stage materials in such a manner that avoids foot traffic over completed waterproofed areas.
- C. Provide temporary walkways and platforms to protect completed Work from traffic and point loading during the application process.
- D. Provide temporary membrane tie-ins and water-stops at the end of each workday and remove prior to commencement of work the following day.

3.10 PREFABRICATED COMPOSITE DRAINAGE AND PROTECTION MAT

- A. Install the drainage mat when it can be followed immediately by the installation of the topping slab. If the drainage mat cannot be installed within one week of membrane application, a protection course must be applied over the membrane to protect from other trade work and UV radiation.
- B. Install the drainage mat on horizontal and vertical surfaces in accordance with the product data sheet. Lay out and position drainage mat, and allow to lay flat. Cut and closely fit drainage mat to perimeter and penetrations.
- C. Overlap filter fabric from adjacent sheets/rolls, and bond all fabric overlaps with Sikaflex sealant. Install supplemental filter fabric as required to ensure filter fabric continuity at flashing locations.

3.11 CLEAN-UP

- A. Work areas are to be kept clean, clear and free of debris at all times.
- B. Do not allow trash, waste, and/or debris to collect on the work area. Trash, waste, and/or debris shall be removed from the work area on a daily basis.
- C. All tools and unused materials shall be collected at the end of each workday and stored off of the finished waterproofed surface and protected from exposure to the elements.
- D. Ensure all unattended tools, material and equipment are stored in a secured area and are not accessible to the public following Section 01565 – SECURITY MEASURES.

- E. Dispose of or recycle all trash and excess material in a manner conforming to current EPA regulations and local laws.
- F. Properly clean the finished deck surface after completion, and make sure the drains and gutters are not clogged.
- G. Clean and restore all damaged surfaces to their original condition.

PART 4 – MEASUREMENT AND PAYMENT

4.01 BASIS OF MEASUREMENT AND PAYMENT

Work under this section will not be measured nor paid for separately, but shall be considered incidental to and included in the prices bid for the various items of work in this project.

END OF SECTION