WJE

SECTION 07 14 16
COLD FLUID-APPLIED WATERPROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes reinforced two-component, cold, fluid-applied, modified-polyurethane waterproofing system for the following applications:
   1. Exterior horizontal surfaces beneath mortar-set tile, over interior occupied space.

B. Related Sections include the following:
   1. Section 09 30 00 – Tile.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Review waterproofing requirements during, but not limited to, the following:
      a. Surface preparation specified in other Sections.
      b. Minimum curing period.
      c. Forecasted weather conditions.
      d. Special details and sheet flashings.
      e. Repairs.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
   2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.

B. Shop Drawings
   1. Show locations and extent of waterproofing.
   2. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

C. Samples: For each exposed product and for each color and texture specified, including the following products:
   1. Cured membrane, 8 by 8 inches.
   2. Sealant

D. Prior to installation of waterproofing system, letter from waterproofing manufacturer stating approval of use of waterproofing system on Project and eligibility for manufacturer's warranty, based on review of:
   1. Manufacturer's Project Registration Form, with information filled out completely and accurately, including deviations from Specification.
   2. Complete set of drawings of waterproofing system installation showing substrate limits, outline, dimensions, transitions, and types and locations of penetrations.
   3. Atypical or special condition details which are to be used.

E. Qualification Data: For Installer.

F. Written field quality-control plan and procedures.

G. Sample Warranties.

1.4 CLOSE-OUT SUBMITTALS

A. Waterproofing manufacturer's warranty inspection reports.

B. Completed joint and several warranty from Contractor and Waterproofing Installer.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.
   1. Employ foreman trained by waterproofing manufacturer and with minimum 5 years of experience as foreman on similar projects, who is fluent in English, to be on Site at all times during Work. Do not change foremen during course of Project except for reasons beyond control of Installer; inform Architect/Engineer in advance of any changes.

B. Mockups: Apply waterproofing for each type of substrate to 50 square feet of deck to demonstrate surface preparation, crack and joint treatment, corner treatment, and execution quality. Embed at least 3 loose tails of reinforcing mesh in waterproofing for adhesion testing.
   1. Document precipitation and dew for 7 days prior to installation of mockup, surface preparation including surface roughness profile, use of moisture barrier and primer, temperature and sun exposure at each step, mixing paddle type, mixer speed and duration of mixing, and wet film thickness of layers.
   2. Cut out samples of cured waterproofing and document presence of blisters, bubbles, pinholes, and thickness of complete system.

3. After waterproofing has fully cured, cut along sides of loose tails of reinforcing mesh down to substrate, and pull tails until they lift up. Waterproofing installation is considered satisfactory if waterproofing fails in cohesion rather than adhesion.
4. If Architect determines mockups do not comply with requirements, modify mockup or construct new mockup until mockups are approved.
5. Approved mockup will be standard for judging completed Work.
6. Approved mockups may become part of completed Work if undisturbed at time of Substantial Completion.

C. Contractor to test substrate moisture content prior to installation of membrane and provide a test log of daily inspection reports to Architect. Testing to be performed in accordance with ASTM F2170 for in situ relative humidity testing of concrete decks. Do not install membrane if test results exceed manufacturer allowable relative humidity levels.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials according to manufacturer's recommendations and in such manner as to prevent damage to materials and structure.

B. Deliver materials to Site in original containers with seals unbroken, labeled with waterproofing manufacturer's name, product brand name and type, date of manufacture, lot number, and directions for storing and mixing with other components.

C. Keep materials dry and do not allow materials to be exposed to moisture during transportation, storage, handling, and installation. Reject and remove from Site new materials which exhibit evidence of moisture during application, or have been exposed to moisture.

D. Store materials in original undamaged containers in clean, dry, protected location on raised platforms with weather-protective coverings, within temperature range required by manufacturer. Protect stored materials from direct sunlight. Manufacturer's standard packaging and covering is not considered adequate weather protection.

E. Limit stored materials on structures to safe loading capacity of structure at time materials are stored, and to avoid permanent deck deflection.

F. Conspicuously mark damaged or opened containers or containers with contaminated materials, and remove from Site as soon as possible.

G. Remove and replace materials that cannot be applied within stated shelf life.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer.
   1. Moisture content in the concrete must be lower than 6% as measured using a Tramex CME 4 Moisture Meter.
   2. Do not apply waterproofing to a damp or wet substrate, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F above dew point.
   3. Do not apply waterproofing in rain, fog or mist, or when such weather conditions are imminent during application and curing period.

B. Maintain adequate ventilation during application and curing of waterproofing materials.

C. Ensure that drains are operational at end of each workday or if precipitation is forecast.

1.8 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace waterproofing that fails in materials or workmanship within specified warranty period.
   1. Warranty includes replacing materials as necessary.
   2. Warranty does not include removal or reinstallation of paver systems.
   3. Warranty Period: 15 years no dollar limit warranty after Substantial Completion date.

B. Joint and Several Warranty by Contractor and Waterproofing Installer:
   1. Written warranty signed by Waterproofing Installer and Contractor, including:
      a. Repair or replace waterproofing that does not comply with requirements; that does not remain watertight; that fails in adhesion, cohesion, or general durability; or that deteriorates in manner not clearly specified by submitted waterproofing manufacturer's data as inherent quality of material for application indicated.
      b. Removal and reinstallation of tile systems. Provide new materials to replace materials that are not suitable for reuse.
      c. Repair or replacement, to satisfaction of Owner, of other work or items which may have been displaced or damaged as consequence of defective work.
   2. Warranty Period: 2 years after Substantial Completion date.

PART 2 PRODUCTS

2.1 MATERIALS, GENERAL

A. Source Limitations for Waterproofing System: Obtain waterproofing materials from single source from single manufacturer or as recommended in writing by manufacturer.

2.2 TWO-COMPONENT, POLYURETHANE WATERPROOFING

A. General: Two-component, polyurethane-methacrylate (PUMA). Provide waterproofing materials recommended by waterproofing manufacturer to be compatible with one another and able to develop bond to substrate under conditions of service and application. Provide waterproofing materials suitable for application to vertical, horizontal, and sloped substrates, as applicable.
   1. Product: Vulkem EWS Under Tile System, Manufactured by Tremco

2.3 MATERIALS

A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with cold, fluid-applied waterproofing material.
   1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

B. Primer: Waterproofing manufacturer's standard, factory-formulated primer with separate products for concrete and cement board substrates. Two-component, chemically curing methyl methacrylate.
   1. Tremco PUMA Primer

C. Base Coats: Polyurethane methacrylate
   1. Tremco PUMA BC

D. Top Coat: Methyl Methacrylate
   1. Tremco PUMA TC

E. Aggregate: Waterproofing manufacturer's standard aggregate for each use indicated of particle sizes, shape, and minimum hardness recommended in writing by traffic-coating manufacturer.
   1. 30-50 mesh silica sand for the primer
   2. 20-40 mesh silica sand for the top coat

F. Accessory Materials'
   1. Initiator; Benzoyl Peroxide: Tremco PUMA Initiator/Initiator+, or approved equal

G. Cleaner; One component methyl methacrylate: Tremco PUMA Cleaner, or approved equal

H. Crack and Joint Detailing Coating: Tremco PUMA BC, or approved equal

I. Cant Beads and Detailing of Penetrations: Tremco PUMA BC T, or approved equal

J. Sealant in contact with membrane shall be as recommended by manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions with waterproofing Installer and waterproofing manufacturer's representative for compliance with requirements and other conditions affecting performance of waterproofing.
   1. Ensure that work done by other trades is complete and ready for waterproofing Work.
   2. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.

3. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
4. Notify Architect/Engineer in writing of conditions which may adversely affect installation or performance waterproofing and recommend corrections.
5. Do not proceed with waterproofing Work until adverse conditions have been corrected and reviewed by Architect/Engineer.
6. Commencing waterproofing Work constitutes acceptance of Work surfaces and conditions per manufacturer's recommendations.

3.2 SURFACE PREPARATION

A. Clean and prepare concrete substrate according to waterproofing manufacturer's written instructions and recommendations in ASTM C1127. Provide clean, dust-free, and dry substrate for waterproofing application.
   1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
   2. Verify that substrate is sound and visibly dry and free of moisture. Test for moisture vapor emission by applying the base coat of waterproofing on 1-foot-square test areas and monitoring for pinholes, blisters, and bubbles until the waterproofing has set; the number and locations of test areas shall be determined by Architect/Engineer based on Project conditions. If pin-holing, blistering, or bubbling occurs, delay Work until later test areas are free of pinholes, blisters, and bubbles.
   3. Verify that concrete curbs, expansion joints, and transitions from one surface plane to another (inside and outside corners) are cleanly formed and free of broken edges and excess concrete.
   4. Remove concrete fins and projections, concrete splatter, and other irregularities which would prevent monolithic, continuous application of waterproofing.
   5. Properly patch substrate defects (such as voids, form tie holes, honeycombing, and cracks) with latex-modified concrete or another material acceptable to waterproofing manufacturer and Architect/Engineer.
   6. Remove grease, oil, asphalt solids, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
   7. Uniformly clean concrete surfaces by abrasive bead blast, according to ASTM D4259, to expose top surface of fine aggregate and provide sound surface, free of laitance, dirt, and other loose or foreign material. Use self-contained, recirculating, blast-cleaning apparatus. Remove remaining loose material and clean surfaces according to ASTM D4258. Produce surface texture equal to CSP 3 from ICRI 310.2. Surface profile shall not exceed 1/4 inch (peak to valley).
   8. Thoroughly sweep substrate and clean with oil-free compressed air.

9. Clean and prepare metal surfaces to white metal in accordance with SSPC - SP3 (power tool clean). Extend preparation to a minimum of 1 inch beyond the termination of the membrane flashing materials. All metal surfaces to be mechanically abraded to provide a rough open surface, wire brush is not acceptable.
10. Follow manufacturer recommendations for concrete substrate joint, crack, leveling and patching surface preparation.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage or overspray affecting other construction.

C. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.

D. Waterproofing Installer and waterproofing manufacturer's representative shall examine substrate to ensure that it is properly prepared and ready to receive waterproofing. Waterproofing manufacturer's representative shall report in writing to Waterproofing Installer and Architect/Engineer conditions which will adversely affect waterproofing system installation or performance. Do not proceed with waterproofing installation until these conditions have been corrected and reviewed by Architect/Engineer.

E. Proceed with installation only after unsatisfactory conditions have been corrected. Commencing installation constitutes acceptance of Work surfaces and conditions.

3.3 PREPARATION AT TERMINATIONS, PENETRATIONS, AND CORNERS

A. Prepare surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, sleeves, and corners according to waterproofing manufacturer's written instructions and to recommendations in ASTM C 898/C 898M and ASTM C 1471.

B. Apply waterproofing in two separate applications, and embed a joint reinforcing strip in the first preparation coat when recommended by waterproofing manufacturer.

C. At terminations of traffic coating exposed to traffic, rout 1/4 by 1/4 inch keyway in concrete.

3.4 JOINT AND CRACK TREATMENT

A. Prepare, treat, rout, and fill joints and cracks in substrate according to waterproofing manufacturer's written instructions and to recommendations in ASTM C 898/C 898M and ASTM C 1471. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D 4258.

B. Provide sealant cants around penetrations and at inside corners of deck-to-wall butt joints. Provide minimum vertical height of 8 inches for all flashing terminations. Flashing is typically constructed as a two part assembly consisting of a vertical wrap and a horizontal target patch. There must be a minimum of a two inch overlap between vertical and horizontal flashing components. Extend membrane into drain bowl and ensure clamp ring engages membrane.

3.5 WATERPROOFING APPLICATION

A. Apply waterproofing according to ASTM C898/C898M and waterproofing manufacturer's written instructions. Waterproofing manufacturer's technical representative shall be present at start of installation.

B. Apply primer over prepared substrates per manufacturer recommendations. Manufacturer to provide primer recommendations for each type of substrate and confirm with contractor prior to membrane installation.

C. Mix materials and apply waterproofing by spray, roller, notched squeegee, trowel, or other application method suitable to slope of substrate.
   1. Apply one or more coats of waterproofing to obtain seamless coating free of entrapped gases, with average dry film thickness per manufacturer recommendations. Use only material supplied by waterproofing manufacturer. Verify wet film thickness of waterproofing every 100 square feet.
   2. Apply waterproofing to prepared wall terminations and vertical surfaces.
   3. Install fleece reinforcing per manufacturer recommendations

D. It is recommended to apply the waterproofing membrane immediately following full curing of the primer in order to obtain the best bond between primer and membrane.

E. Mix and apply cold fluid-applied reinforced polyurethane waterproofing membrane in strict accordance with written instructions of waterproofing manufacturer. Use only proprietary membrane resins and materials, as supplied by the waterproofing manufacturer.

F. The primed substrate surface shall be dry, with any remaining dust or loose particles removed using clean, dry, oil-free compressed air, industrial vacuum, cloth-wipe or a combination.

G. Protect all areas where membrane has been installed. Do not work off installed membrane during application of remaining work before forty-eight (48) hours of curing. Movement of materials and equipment across installed membrane is not acceptable. If movement is necessary, provide complete protection of affected areas.

H. Closely follow the waterproofing manufacturer's recommendation for application. Monitor surface and ambient temperatures, including the effects of wind chill

I. Disposal of Resin:
   1. Cured resin may be disposed of in standard landfills. This is accomplished by thoroughly mixing all components.
   2. Uncured resin is considered a hazardous material and must be handled as such, in accordance with local, state and federal regulation. Do not throw uncured resin away.

J. Reinforce all inside outside corners with 4 inch diameter conical piece of membrane prior to installing the exposed flashing layer. Extend all flashing a minimum of 4 inches onto the field substrate surface.

K. Surfacing and Finishes:
   1. Aggregate Finish Surfacing
      a. Where mortar is specified over the cold fluid-applied membrane, provide and install waterproofing manufacturer's recommended primer and approved kiln-dried silica sand, or other approved mineral surfacing to achieve an aesthetic and/or non-skid surface.
      b. Pre-mix single-component and two-component coatings prior to application to achieve an even consistency.
      c. Broadcast specified and approved sand or aggregate in excess into a bonding coat application of waterproofing manufacturer's approved urethane-based or acrylic-based aggregate coating system applied over clean, cured membrane at the manufacturer's recommended application rate. Aggregate shall be applied to excess to obtain uniform and full coverage.
      d. Following minimum 24 hour cure time remove loose/un-embedded mineral aggregate by blowing with oil-free compressed air or with a vacuum. Re-broadcast clean mineral aggregate as required to provide full embedment and coverage of membrane.
      e. Seal aggregate surface with a sealing coat application of waterproofing manufacturer's approved aggregate coating, applied at the manufacturer's recommended application rate. After completion of surfacing, avoid any traffic for a minimum of three days to allow for surfacing to cure.
   2. Coating-Type Finish Surfacing
      a. Where specified, provide and install waterproofing manufacturer's approved urethane-based or acrylic-based coating applied over clean, fully cured membrane at the manufacturer's recommended application rate.
      b. Pre-mix single-component and two-component coatings prior to application to achieve an even consistency and color. Mix thoroughly for approximately 2 minutes with a clean spiral agitator or stir stick without creating any bubbles or streaks. DO NOT AERATE.

c. Apply coating at the manufacturer's recommended application rate. Two coating applications are recommended for best coverage and appearance. After completion of coating, avoid any traffic for a minimum of two days to allow for surfacing to cure.
d. Cure waterproofing according to waterproofing manufacturer's written recommendations, taking care to prevent contamination and damage during application stages and curing.
e. Do not allow any construction activity on waterproofing until water test is complete.
f. At internally drained locations, before installing overburden, flood test waterproofing and repair any leaks.

3.6 FIELD QUALITY CONTROL

A. Site Visits by Waterproofing Manufacturer's Representative: Waterproofing manufacturer's representative shall visit Site at following times.
   1. At beginning of waterproofing installation to establish standard of quality to be used for remainder of waterproofing Work.
   2. Periodically during Work at critical times and as required to meet provisions of waterproofing manufacturer's warranty.
   3. Submit written report with observations, field decisions, and request for design changes to Architect/Engineer for each Site visit.
   4. Coordinate Site visits with Architect/Engineer.

A. Water Leak Testing:
   1. High Voltage Integrity Testing (HVIT): HVIT shall be performed prior to the application of the aggregate layer. Testing will be performed in general accordance with ASTM D 4787.
   2. If pinholes or other anomalies are detected by the HVIT testing, then install additional product to coat over and seal the pinholes.
   3. If anomalies are found, contractor shall conduct repairs at anomalous locations. Additional HVIT testing shall be completed at repair areas until all anomalies are resolved, at no additional cost to the Owner.

B. Notify Architect 48 hours in advance of testing.
   1. Architect will observe flood testing and examine underside of decks and terminations for evidence of leaks during flood testing.

3.7 CLEANING

A. At end of each workday, clean Site and Work areas and place rubbish, empty cans, rags, and other discarded materials in appropriate containers.
B. After completing waterproofing Work:
   1. Clean spillage and soiling from adjacent surfaces using cleaning agents and procedures recommended by manufacturer of affected surface. Exercise care to avoid scratching or damage to surfaces.

2. Repair surfaces stained, marred, or otherwise damaged during waterproofing Work.
3. Clean up debris and surplus materials and remove from Site.

C. Waste Management:
1. Collect surplus waterproofing materials that cannot be reused and deliver to recycling or disposal facility.
2. Treat materials that cannot be reused as hazardous waste and dispose of in appropriate manner.

3.8 PROTECTION & COORDINATION

A. Protect waterproofing from damage and wear during remainder of construction period.
1. Do not permit foot or vehicular traffic on unprotected waterproofing.
2. Do not allow waste products (petroleum, grease, oil, solvents, vegetable oil, mineral oil, animal fat, etc.) to come into contact with waterproofing. Exposure to foreign materials or chemical discharges must be presented to waterproofing manufacturer for evaluation to determine impact on waterproofing performance.

B. Do not install waterproofing or accessories to substrates that will be at a constant temperature in excess of 180 degrees F (i.e., hot pipes and vents, direct steam venting, etc.).

C. Coordinate the work with the installation of associated trades including mechanical, electrical, plumbing, sheet metal, etc.

D. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

E. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION