SECTION 09 05 61.13

MOISTURE VAPOR EMISSION CONTROL

PART 1 – GENERAL

1.01 SECTION INCLUDES

1. Furnish all labor, materials, tools and equipment as necessary to perform installation of concrete floor sealer on new and/or existing concrete slabs at locations identified in Contract Documents.
2. Removal of existing floor coverings as covered by selective demolition.
3. Repairs, patching, and preparation of existing and/or new concrete floor slabs for installation of new floor coverings.
4. Testing and remediation of floor slabs due to unsatisfactory moisture and alkalinity conditions.

1.02 RELATED REQUIREMENTS

1. Division 02 – Existing Conditions; Selective Demolition
2. Section 03 30 00 – Cast-In-Place Concrete
3. Section 03 53 00 – Concrete Topping
4. Division 09 – Finishes; Flooring Sections

1.03 REFERENCE STANDARDS

1. Curing Standards
2. ASTM C156–17: Standard Test Method for Water Loss
3. ASTM C39 / C39M-18: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
4. ASTM C1202-19: Standard Test Method for Electrical Indication of Concrete’s Ability to Resist Chloride Ion Penetration
5. ASTM C309-19: Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
6. ASTM D7234: Standard Test Method for Pull-Off Adhesion Strength of Cylindrical Concrete Specimens
7. Concrete Moisture Standards
8. ASTM D1653-13: Standard Test Methods for Water Vapor Transmission of Organic Coating Films
9. ASTM E96/E96M-16: Standard Test Methods for Water Vapor Transmission of Materials
10. ASTM F2170-19: Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
11. ASTM F1869-16a: Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
12. Floor Preparation Standards
13. ASTM C109/C109M-20: Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube Specimens)
14. ASTM F710-2017: Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
15. RFCI (RWP)-2011: Recommended Work Practices for Removal of Resilient Floor Coverings

1.04 ADMINISTRATIVE REQUIREMENTS

1. Coordinate materials specified in flooring sections for make, type and application method of adhesive and verify compatibility with sealer manufacturer.
2. Receive approval of sealer manufacturer if installation of finish flooring will be less than 30 days after concrete pour.
3. Schedule cleaning and testing so that preliminary cleaning has been complete for at least 24 hours prior to testing.

1.05 SUBMITTALS

1. In accordance with Section 01 30 00 - Administrative Requirements, for submittal procedures.
2. Installer Licensing and Certification: Product must be installed by a licensed installer working for a company that is certified by manufacturer.
	1. Submit documentation that installer has been trained and licensed by moisture vapor emission control manufacturer and is employed by submitting company.
	2. Submit documentation that installation company is certified by moisture vapor emission control manufacturer.
	3. Installation by unlicensed or uncertified installers shall void product warranty.
3. Floor Covering and Adhesive Product Data: Provide manufacturer’s product literature and testing data, listing applications and limitations showing:

1. Manufacturer’s required compatibility and bond test procedure(s)

2. Moisture and alkalinity (pH) limits and testing procedure(s) and method(s)

3. Submit for all combinations of substrate, flooring finish, and adhesive application.

1. Floor Remediation Material Product Data: Provide manufacturer's product literature and testing data, listing applications and limitations for all remediation products used.
2. Manufacturer’s qualifications.
3. Manufacturer statement of compatibility of flooring types installed over remediation product(s).
4. Testing reports indicating compliance with performance requirements.
5. Manufacturer’s installation requirements and instructions.
6. Testing Reports to be submitted within two business days after completion of testing:
7. Summary of conditions.
8. Identification of areas tested; include floor plan of testing limits.
9. Test result reports for moisture and alkalinity.
10. Copies of test methods used for all testing.
11. Recommendations for remediation, if applicable, including product data for remediation materials and products.
12. Adhesive bond and compatibility test results.
13. Specimen Warranty: Provide copy of warranty to be submitted by coating manufacturer to ensure that forms have been completed in Owner's name and registered with manufacturer.

1. For warranty to be valid, Contractor MUST receive manufacturer approval of flooring adhesive(s) compatibility.

1.06 QUALITY ASSURANCE

1. Testing Qualifications (Contractor Responsibility):
2. Moisture and alkalinity testing shall be performed by a certified independent testing agency or demonstrated competent person.
3. Adhesive and bond testing may be performed by Contractor, demonstrated competent person, or independent testing agency.
4. Testing Agency Qualifications: Must be experienced in types of testing specified and shall submit statement of qualifications demonstrating no less than 5 completed test reports of the types required.
5. Contractor Responsibilities Related to Testing:
	1. Coordinate and provide unrestricted access to testing agency.
	2. Coordinate start date of testing and provide notification at least 5 days prior to start and coordinate testing duration with other construction activities.
	3. Achieve and maintain required ambient conditions at testing areas.
6. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience, and demonstrate at least 5 completed projects with specified products.
7. Installer Qualifications: Installation must be completed by a licensed installer working for a company that is certified with a minimum of a Class B certification or higher.
8. Installer Qualifications: Installer must be a trained and licensed installer working for a company that has a Class B or higher certification to qualify for the warranty. Installation that does not meet those requirements are void of the warranty and installation in performing work of the type specified requires at least three years of experience installation moisture mitigation / emission coatings.

1.07 DELIVERY, STORAGE, AND HANDLING

* 1. Deliver, store, handle, and protect products in accordance with manufacturer’s recommendations and instructions.
	2. Deliver materials to project site in original, unopened containers.
	3. Store materials in protected area not subject to freezing or high temperature between 40° F and 90° F.
	4. Store closed containers in well-ventilated space.
	5. Wear protective clothing, gloves, and eyewear when applying.
	6. If engineering controls do not maintain airborne concentrations below the applicable workplace exposure limits, or to an acceptable level (if exposure limits have not been established), a respirator approved by recognized national standards (or equivalent) must be worn.

**1.08 FIELD CONDITIONS**

1. Coordinate testing and installation timeline with General Contractor’s and/or Owner’s schedule and potential other adjacent work that may create or cause adverse conditions for installation.
2. Ambient Conditions: Do not install sealer when concrete is less than 40° F, or more than 90° F for a minimum of 24 hours before or after application.
3. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside the manufacturer’s absolute limits.

1.09 WARRANTY

1. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
2. Provide 25-year manufacturer’s warranty for coverage against damage to flooring or flooring adhesive materials due to concrete moisture. In the event the sealer exhibits (and proves) manufacturing defects leading to moisture emissions that damage the finished flooring system, the 25-year manufacturer’s warranty will replace the defect product and cover the reasonable direct labor and material expenses associated with removing and replacing the finished flooring system damaged directly as a result of these manufacturing defects in sealer.
3. For product warranty to be valid, it must be installed by a licensed installer working for a company that is certified with a Class B Certification or higher.
4. Exclusions:
5. Claims related to installation or defective workmanship, including issues from inadequate surface preparation, use of other or incompatible products, or not following installation instructions.
6. Claims covered under other warranties that are void due to sealer usage.
7. Defects or damages from structural flaws, previous sealers or coatings, or substrate issues.
8. Damage from inadequate maintenance, improper installation of flooring products, or use of defective or unapproved adhesives.
9. Damage due to appliance malfunctions, leaky faucets, broken pipes, or inadequate building system maintenance.
10. Damage from physical abuse, vandalism, improper usage, or overloading of the structure.
11. Damage from natural disasters or acts of God, like floods, excessive rainfall, tornadoes, fires, hurricanes, etc.
12. Claims related to the suitability of the product.
13. Void if installation is completed by an unlicensed installer or a licensed installer working for a company that does not have proper certification.
14. Adequate time must be provided for investigation of damages to prove it as result of defective product.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

* + 1. Acceptable Manufacturer: Concrete Moisture Mitigation, 7402 N 56th St Ste 355, Tampa FL, 33617; Telephone: (656) 225-3330; Email: info@concretemm.com; Web: www.concretemoisturemitigation.com.
			1. Basis of design: Hydro-Block
		2. Substitutions: Must provide demonstrated equality to specified basis of design product in accordance with Section 01 6000 – Product Requirements and submitted in accordance with Section 01 2500 – Substitution Procedures.
			1. Requests for substitutions will only be considered when the proposed product is equal to all referenced standards, quality assurance, and warranties as noted within the provisions in Part 1 and performance requirements as noted within Part 2.

2.02 PERFORMANCE REQUIREMENTS

* 1. Single or multi-layer coating or coating/overlay combination intended by its manufacturer to achieve thickness as required to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
	2. Penetrating Concrete Sealer Performance (based on 4,500 psi concrete test slab results):
1. Adhesion at 7 Days, ASTM D7234: 650 psi
2. Water Vapor Transmission, ASTM E96: 2.72 lbs. / 1,000 sq. ft. per 24 hours
3. Moisture Vapor Emission Rate, ASTM F1869: 2.81 lbs. / 1,000 sq. ft. per 24 hours

2.03 MATERIALS

1. Concrete Sealer:
2. Composition: Water-based silicate penetrating compound.
3. VOC Content: EPA Method 24; Zero VOC’s.
4. Finish: Transparent, no sheen. May make surface of the slab appear to have a darker shade.

2.04 SUPPLEMENTAL MATERIALS AND ACCESSORIES

1. Surface Preparation: Etch-2-Bond by Concrete Moisture Mitigation
2. Patching Compound and Leveling Surface: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
3. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor substrate, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
4. Latex or polyvinyl acetate additions are permitted; gypsum content is prohibited. Gyp-Crete Product is prohibited from being used with this product.
5. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M. Skim coatings do not have compressive strength requirements.

PART 3 – EXECUTION

3.01 PREPARATION

* 1. Any existing flooring finish surfaces shall be removed per Division 02 selective demolition requirements.
	2. Perform any moisture emission and alkalinity tests as required for new floor finish adhesion requirements and in accordance with all testing procedures specified herein or by floor finish manufacturer’s requirements.
	3. Existing Concrete with Surface Coatings: Provide clean, porous surface by:
1. Mechanically profiling surface by diamond grinding or shot blasting surface.
2. Gypsum-based underlayment, concrete with known moisture problems or over 20 years of age must receive skim coat of concrete; contact manufacturer for exceptions to this requirement.
3. All flooring with Epoxy or Resinous coating requires shotblasting to a minimum of CSP 3.
	1. If slab has no existing surface coatings but has received a hard-trowel or burnished finish either:

1. Apply surface preparation (Etch-2-Bond) per manufacturer’s instructions, or

2. Mechanically profile surface by diamond grinding or shot blasting surface.

* 1. Verify that cracks are routed out and filled with Portland cement 4 inches beyond edges of crack.
1. Cover trench saw cuts with cement-based coating prior to application of sealer.
2. Do not fill expansion joints, isolation joints, control joints, or other movement joints.
	1. Patching, leveling, and smoothing of concrete substrate(s) as required.
	2. Thoroughly clean floor, of dust, paint, gypsum board compound, residual adhesive and other materials that interfere with complete coverage of sealer.
3. Use of solvents or other chemical cleaners is prohibited.
	1. Verify ambient condition requirements are achieved.
	2. Protect surrounding finish surfaces within at least 24 inches from overspray of sealer.
	3. Ensure that areas to receive sealer are well ventilated.

3.02 INSTALLATION

1. Install in accordance with manufacturer's instructions.
2. Contact manufacturer for approval if flooring will be installed less than 14 days after application of sealer.
3. Curing compound is not required after application of sealer.
4. Before application of adhesives or flooring, perform moisture testing. A Polyethylene Film Test is required. Tape 12” x 12” x 6ml polyethylene sheeting, sealing all edges with a plastic, moisture resistant tape, and leave covered for 24 hours. If moisture appears beneath the test patch, concrete is not dry enough to proceed, the product was installed incorrectly and will need to be reapplied. If no moisture beads up under the 6ml poly sheathing, then the sealer was applied correctly and flooring can be installed in accordance with the installation directions. Before and after images of the 24-hour test are required to be taken and documented.
5. Allow product to dry for a minimum of 6 hours or dry to the touch. When installing sealer in high humidity, 70% RH or above, it is recommended the product dries for 12 hours or overnight for best results.

**3.03** **APPLICATION AT PREVIOUSLY PLACED AND CURED NEW CONCRETE**

1. Apply first coat of sealer and let dry for no more than 10 minutes.
2. Apply second coat of sealer while first is still wet, and only to areas where sealer has penetrated, and the texture of the concrete is apparent.
3. Use broom or brush to spread pooled sealer.
4. Allow product to dry for a minimum of 6 hours or dry to the touch. When installing in high humidity, 70% RH or above, it is recommended the product dry for 12 hours or overnight for best results**.**

**3.04** **APPLICATION AT TIME OF CONCRETE PLACEMENT FOR BURNISHED FINISH**

1. Do not apply cure and seal products or water during curing. Apply sealer during finishing phase.
2. Allow slab to dry and harden until slab is firm enough to walk on after final troweling with only minor indentations.
3. Apply sealer in front of trowels at manufacturer’s recommended rate, trowel as needed to achieve desired finish.

**3.05 APPLICATION AT TIME OF CONCRETE PLACEMENT FOR NON-BURNISHED FINISH**

1. Do not apply cure and seal products or water during curing.
2. Do not burnish concrete when troweling.
3. Allow slab to harden until slab is firm enough to walk on without any indentations.
4. Apply sealer in front of trowels at manufacturer’s recommended rate, allow to absorb for 5 to 8 minutes.
5. Apply second coat to areas where first coat has penetrated.

**3.06 EXISTING CONCRETE WITH PRIOR COATING APPLICATIONS**

1. Sealer must be applied after leveling coat of concrete is applied to shot blasted surfaces.
2. Apply sealer at manufacturer’s recommended rate, allow sealer to absorb for **no more** than 10 minutes.
3. Apply second coat to areas while first coat is still wet but has penetrated concrete.
4. Allow product to dry for a minimum of 6 hours or dry to the touch. When installing in high humidity, 70% RH or above, it is recommended the product dries for 12 hours or overnight for best results**.**
5. Remove loose dry product by sweeping and/or lightly scraping concrete.

3.07 CLEANING

1. Vacuum loose particles prior to applying approved flooring adhesives.
2. Contractor shall properly dispose of all waste, including empty material canisters, disposable protection, tools, and brushes, etc.
3. Follow manufacturer's instructions for proper application of adhesives follow the manufacturer's instructions. The slab needs to be cleaned and you need to follow manufacturer's instructions for adhesives being applied.

3.08 PROTECTION

* 1. Do not permit traffic on floor surface until fully dried.

**3.09 POST INSTALLATION**

1. After the sealer is cured and the dry time is completed, post installation moisture testing (Polyethylene Film Test) is required. Tape 12” x 12” x 6ml polyethylene sheeting, sealing all edges with a plastic, moisture resistant tape, and leave covered for 24 hours. If moisture appears beneath the test patch, concrete is not dry enough to proceed, the product was installed incorrectly and will need to be reapplied. If no moisture beads up under the 6ml poly sheathing, then the sealer was applied correctly and flooring can be installed in accordance with the installation directions. Images must be taken and documented at the beginning and end of the 24 hour test.
2. Follow manufacturer's instructions for proper application of adhesives, floor must be cleaned prior to adhesive application and flooring installation.
3. The only adhesives approved post application are adhesives that can be applied per spec over non-porous substrates. The substrate after sealer is applied is non-porous.

END OF SECTION