

SECTION 09 61 05

MOISTURE VAPOR EMISSION AND ALKALINITY CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Water vapor reduction system and cementitious underlayment on new and existing concrete slabs where necessary to obtain a minimum moisture vapor emissions rate of 75 percent maximum for moisture sensitive flooring schedule to receive carpet, resinous flooring, or moisture sensitive flooring.

1.2 DEFINITIONS

- A. MVE: Moisture vapor emission.
- B. MVER: Moisture vapor emission rate.

1.3 ACTION SUBMITTALS

- A. Product Data: Technical data for each type of product used in moisture vapor emission (MVE) control system.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Schedule: Submit schedule for identifying each floor area to receive moisture vapor emission and alkalinity control system. Use same room label and numbering designations indicated on Drawings.
 1. Distinguish between those areas required to receive cementitious surfacing over moisture vapor emission and alkalinity control system and those areas where not required.
- B. Qualification Data: Submit data for installer.
- C. Product Test Reports:
 1. Submit test reports performed by manufacturer and witnessed by a qualified testing agency or a qualified testing agency.
 2. Preinstallation Moisture Vapor Field Test Reports: For each area receiving carpet, resinous flooring, or moisture sensitive flooring, submit test result reports for vapor and moisture testing and alkalinity and adhesion testing for new and existing concrete substrates.
- D. Preconstruction Test Reports: Submit test reports for alkalinity, calcium chloride, and relative humidity of concrete slabs for each area receiving floor covering.

- E. Warranty: Submit for warranty for vapor emission control coating system and certificate of underwriter's coverage of manufacturer's warranty.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Entity having minimum five years documented experience in the manufacturer of MVE control system and who employs factory trained personnel available for consultation and site inspection.
 - 1. The water vapor emission reduction system must be specifically formulated and marketed for water vapor emission reduction and alkalinity control without change of system design for a minimum period of 10 years.
- B. Installer Qualifications: Entity having minimum 5 years documented experience in the installation of MVE control systems who is an authorized representative and is trained and approved by manufacturer.
- C. Testing Agency Qualifications: Moisture and pH testing shall be performed by an International Concrete Repair Institute (ICRI), Certified Concrete Slab Moisture Testing Technician – Grade 1.
- D. Preinstallation Testing Service: At least 28 days after placement of concrete and prior to floor covering installation, Owner will engage a qualified independent testing agency to perform the following tests on floor areas to receive moisture vapor emission and alkalinity control system:
 - 1. Calcium chloride testing per ASTM F 1869.
 - 2. Relative humidity testing per ASTM F 2170.
 - 3. Alkalinity testing per ASTM F 710.
- E. Preinstallation Conference: Conduct conference at site. Review methods and procedures related to installation including, but not limited to, the following:
 - 1. Review substrate conditions, moisture and pH test results, manufacturer's installation instructions, and warranty requirements.
 - 2. Document proceedings, including required corrective measures.

1.6 COORDINATION

- A. Coordinate testing agency to test concrete slabs no sooner than one week or more than 5 weeks prior to scheduled flooring installation.
 - 1. Apply treatment to areas with moisture vapor emission or relative humidity rates which exceed floor covering manufacturer's written limits, as determined by ASTM F 1869 and ASTM F 2170 testing.
- B. Coordinate testing with installation of floor coverings. Ensure flooring installation complies with MVE control system manufacturer's warranty requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating directions for storage and mixing with other components.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Comply with MVE control system manufacturer's written instructions for substrate and ambient temperatures, humidity, ventilation, and other conditions affecting system installation.
 - 1. Store system components in a temperature controlled environment and protected from weather and at ambient temperature of not less than 65 degrees F (18 degrees C) and not more than 85 degrees F (29.4 degrees C) at least 48 hours before use.
 - 2. Maintain ambient temperature and relative humidity in installation areas within range recommended in writing by MVE control system manufacturer, but not less than 65 degrees F (18 degrees C) or more than 85 degrees F (29.4 degrees C) and not less than 40 or more than 60 percent relative humidity, for 48 hours before installation, during installation, and for 48 hours after installation unless longer period is recommended in writing by manufacturer.
 - 3. Install MVE control systems where concrete surface temperatures will remain a minimum of 5 degrees F (3 degrees C) higher than the dew point for ambient temperature and relative humidity conditions in installation areas for 48 hours before installation, during installation, and for 48 hours after installation unless longer period is recommended in writing by manufacturer.

1.9 WARRANTY

- A. Total System Warranty: Written warranty signed by manufacturer in which the manufacturer agrees to repair or replace components of treatment system, hydraulic cementitious underlayment, floor covering materials, including primer and adhesives, and installation labor for same period resulting from moisture vapor emission related failure that fail in materials or workmanship within specified warranty period.
 - 1. Moisture Vapor Emissions Reduction Rate: Warranty shall warrant the reduction of moisture vapor emissions from a maximum of 25 pounds per 1000 sq. ft./24 hours to no more than 3 pounds per 1000 sq. ft./24 hours determined by the Calcium Chloride Test Method ASTM F1869 and 100% RH using the Relative Humidity Method ASTM F2170.
 - a. System will not fail due to a manufacturing defect and shall prevent flooring damage and bond failure caused by vapor emissions from concrete substrate.
 - 2. Total System Warranty includes the use of a manufacturer's products listed as a total system.
 - 3. Warranty Period: 10 years from date of Substantial Completion.

- B. Terms and Conditions: Warranty underwritten by product liability insurance carrier having a minimum "A" rating from Best or equivalent rating system in the amount of \$1,000,000 per occurrence.
 - 1. Warranty shall warrant moisture vapor and alkalinity emission rates to be at or below published requirements of floor covering manufacturers.
 - 2. Warranty shall not exclude concrete slabs containing silica or silicate compounds.
- C. Installation Warranty: Written warranty signed by installer in which installer agrees to repair or replace MVE installation that fail in workmanship within specified warranty period.
 - 1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. MVE Control System Capabilities: Capable of suppressing MVE without failure where installed on concrete that exhibits the following conditions:
 - 1. MVER: Maximum 25 lb of water/1000 sq. ft. (11.34 kg of water/92.9 sq. m) when tested according to ASTM F 1869.
 - 2. Relative Humidity: Maximum 100 percent when tested according to ASTM F 2170 using in situ probes.
- B. Water-Vapor Transmission: Through MVE control system, maximum 0.02 perm (1.15 ng/Pa x s x sq. m) when tested according to ASTM E 96/E 96M.
- C. Tensile Bond Strength: For MVE control system, greater than 200 psi (1.38 MPa) with failure in the concrete according to ASTM D 7234.
- D. Surface Alkalinity: ASTM 710, pH between 7.0 and 8.5.

2.2 CONTROL SYSTEM

- A. Manufacturers: Subject to compliance with requirements, provide products manufactured by one of the following:
 - 1. MVE Barrier Treatment:
 - a. Ardex Engineered Cements, Inc.; MC ULTRA Moisture Control System.
 - b. BASF; MasterTop VB 240FS.
 - c. Custom Building Products, Tech MVC Moisture Vapor and Alkalinity Barrier.
 - d. Laticrete SuperCap; Moisture Vapor Control.
 - e. Maxxon; Aquafin Vaportight Coat series.
 - f. TEC/HB Fuller; LiquiDam Moisture Vapor Barrier.
 - g. USG: Durock Brand RH-100 Moisture Vapor Reducer.
- B. System Description: Multicomponent or single component, fluid applied penetrants or coatings intended to seal or stabilize internal humidity by restricting excessive moisture

and pH (alkalinity), and to mechanically regulate permeability and suppress the volume of moisture reaching concrete surfaces, for compliance with subsequent floor covering manufacturer's written limitations.

1. Determine application methods by site conditions, presence of subslab vapor barriers for slabs on grade, concrete mix design and contaminants, age of concrete substrate, results of ASTM F1869 calcium chloride testing, if required, and finish floor covering manufacturer's recommendations.
- C. MVE and Alkalinity Control System: ASTM F 3010 qualified two component, fluid applied penetrants or coatings intended to seal or stabilize internal humidity by restricting excessive moisture and pH (alkalinity), and to mechanically regulate permeability and suppress the volume of moisture reaching concrete surfaces, for compliance with subsequent floor covering manufacturer's written limitations.
1. Physical Properties:
 - a. Water Vapor Transmission: ASTM E 96; Minimum 94% reduction under laboratory conditions
 - b. Alkali Resistance: ASTM D 1308; Pass, up to pH of 14
 - c. Adhesion Strength: ASTM D 4541; 500 psi (100% Concrete Adhesive Failure)
 - d. Relative Humidity: Resists up to 100% Relative Humidity as measured by ASTM F 2170.
 2. Substrate Primer: Provide MVE control system manufacturer's concrete substrate primer if required for system indicated by substrate conditions.
 3. Cementitious Underlayment Primer: If required for subsequent installation of cementitious underlayment products, provide MVE control system manufacturer's primer to ensure adhesion of products to MVE control system.
- D. Accessories:
1. Patching and Leveling Material: Moisture, mildew, and alkali resistant portland cement product recommended in writing by MVE control system manufacturer and with minimum of 3000 psi (20.68-MPa) compressive strength after 28 days when tested according to ASTM C 109/C 109M.
 2. Crack Filling Material: Resin based material recommended in writing by MVE control system manufacturer for sealing concrete substrate crack repair.
 3. Cementitious Underlayment: Refer to Section 03 54 16. Portland cement based, self leveling compound applied to areas receiving resilient or wood flooring. Cement must bond with subsequent floor coverings and adhesives.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for maximum moisture content, installation tolerances, and conditions affecting performance of the work.
- B. Prepare written report listing conditions detrimental to performance.

- C. Proceed with installation after correcting unsatisfactory conditions. Commencement of installation of system indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Preinstallation Testing:

1. Testing Agency: Owner will engage a qualified testing agency to perform tests.
2. Surface Alkalinity Testing: Perform pH testing according to ASTM F 710. Install MVE control system in areas where pH readings are less than 7.0 and in areas where pH readings are greater than 8.5.
3. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m) unless otherwise noted, and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Install MVE control system in locations where concrete substrate MVER exceeds 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - b. Internal Relative Humidity Test: Using in situ probes, ASTM F 2170. Install MVE control system in locations where concrete substrates exhibit relative humidity level greater than 75 percent.
4. Tensile Bond Strength Testing: For typical locations indicated to receive installation of MVE control system, install minimum 100-sq. ft. (9.29-sq. m) area of MVE control system to prepared concrete substrate and test according to ASTM D 7234.
 - a. Proceed with installation where tensile bond strength is greater than 200 psi (1.38 MPa) with failure in the concrete.

B. Concrete Substrates: Prepare and clean substrates according to MVE control system manufacturer's written instructions to ensure adhesion of system to concrete.

1. Remove coatings and substances incompatible with MVE control system and that contain soap, wax, oil, or silicone, using mechanical methods recommended in writing by MVE control system manufacturer. Do not use solvents.
2. Provide concrete surface profile complying with ICRI 310.2R CSP 3 by shot blasting using apparatus that abrades the concrete surface with shot, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
3. After shot blasting, repair damaged and deteriorated concrete according to MVE control system manufacturer's written instructions.
4. Protect substrate voids and joints to prevent resins from flowing into or leaking through them.
5. Fill surface depressions and irregularities with patching and leveling material.
6. Fill surface cracks, grooves, control joints, and other nonmoving joints with crack filling material.
7. Allow concrete to dry, undisturbed, for period recommended in writing by MVE control system manufacturer after surface preparation, but not less than 24 hours.
8. Remove dirt, debris, or existing sealant from cracks and joints. Treat dynamic joints with coating by applying a layer into the joint to completely coat walls of the cavity.

After curing, fill joint with backer rod while leaving joint top open for sealant treatment.

9. Prior to installation of MVE control systems, broom sweep and vacuum prepared concrete.
- C. Protect walls, floor openings, electrical openings, door frames, and obstructions during installation.

3.3 INSTALLATION

- A. Apply MVE and alkalinity control system in accordance with ASTM F 3010 and manufacturer's written instructions to produce a uniform, monolithic surface free of surface deficiencies such as pin holes, fish eyes, and voids.
 1. Install primers as required to comply with manufacturer's written instructions.
- B. Do not apply MVE control system across substrate expansion, isolation, and moving joints.
- C. Apply system, including component coats if any, in thickness recommended in writing by MVE control system manufacturer for MVER indicated by preinstallation testing.
- D. Cure MVE control system components according to manufacturer's written instructions. Prevent contamination or other damage during installation and curing processes.
- E. After curing, examine MVE control system for surface deficiencies. Repair surface deficiencies according to manufacturer's written instructions.
- F. MVE Cementitious Underlayment: Apply cementitious surfacing over cured membrane in areas to receive tile carpet, wood, resilient flooring, or other moisture sensitive flooring to facilitate adhesive bond.
 1. Apply at minimum thickness of 1/8 inch (3 mm).

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform installation inspections.
- B. Installation Inspections: Inspect substrate preparation and installation of system components to ensure compliance with manufacturer's written instructions and to ensure that a complete MVE control system is installed without deficiencies.
 1. Verify surface preparation meets requirements.
 2. Verify component coats and complete MVE control system film thickness comply with manufacturer's written instructions.
 3. Verify MVE control system components and installation areas that evidence deficiencies are repaired according to manufacturer's written instructions.
- C. MVE control system will be considered defective if it does not pass inspections.

3.5 PROTECTION

- A. Protect MVE control system from damage, wear, dirt, dust, and contaminants before floor covering installation. Use protective methods and materials, including temporary coverings, recommended in writing by MVE control system manufacturer.
- B. Do not allow subsequent preinstallation examination and testing for floor covering installation to damage, puncture, or compromise the MVE control system membrane.

END OF SECTION