SECTION 09 61 43 – vapour-control flooring treatment

1. General

SPEC NOTE: Use the following when liquid-applied flooring is scheduled (ex. Epoxy flooring, terrazzo flooring…)

SPEC NOTE: This section is designed to reduce moisture vapour transmission through the slab, which can cause debonding / delamination / bubbling of finished floor materials.

* 1. SUMMARY
     1. Section Includes:
        1. Liquid-applied penetrating vapour control system for new concrete slabs or existing concrete slab-on-grade substrates to receive liquid-applied floor coverings where on-site moisture vapour transmission exceeds the limitations of the floor covering manufacturer's published recommendations.
        2. Provide a complete vapour control system including all items necessary, even if not specifically noted.
  2. DEFINITIONS
     1. pH: Used in this Section to mean "alkalinity" as described in ASTM F 710.
  3. PRE-INSTALLATION CONFERENCE
     1. Contractor shall hold pre-installation conference two (2) weeks prior to commencing work of this Section. Conference shall be attended by the Contractor, Owner, Consultant, concrete finishing subcontractor, epoxy subcontractor, and vapour-control flooring treatment installers and manufacturer's representative to discuss the following, but not limited to the following:
        1. Substrate conditions, non-structural cracks, structural cracks, and preparation requirements.
        2. Floor surface irregularities and levelness tolerances, including all remedial requirements.
        3. Field test results of moisture levels of concrete prior to application.
        4. Installation of vapour-control flooring treatment.
        5. Inspections during the work.
     2. Contractor shall ensure that manufacturer's representatives issues written installation instructions at the pre-installation conference, to all parties attending the pre-installation conference and the Consultant, for all vapour-control flooring treatment required for the work of this Section.
     3. Contractor shall within seventy-two (72) hours of the pre-installation conference, prepare minutes of the conference, and issue minutes to all parties attending the pre-installation conference and the Consultant. Contractor shall clearly indicate required actions and by which party.
  4. SUBMITTALS
     1. Action Submittals:
        1. Product Data: For each type of product indicated, including but not limited to the following:
           1. Data to indicate compliance with specified requirements.
           2. List of system use and performance history, for the same formulation and system design, listing reference sources for a minimum of ten (10) years.
           3. Manufacturer's recommended installation procedures, including the basis for accepting or rejecting actual installation procedures used on the Project.
     2. Informational Submittals:
        1. Manufacturer Certificates: Manufacturer's certificate that certifies acceptance and exposure to continuous topical water exposure after final cure.
        2. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
        3. Material Test Reports: Independent test results indicating compliance with the performance requirements.
        4. Moisture Testing Reports: Field test results of moisture testing prior to application.
        5. Field Quality-Control Report: Manufacturer's field reports indicating full compliance by the installer of the specified system and that the system was in full compliance with all requirements of this Section.
  5. QUALITY ASSURANCE
     1. Installer's Qualifications: Engage an experienced Installer, approved, and certified in writing by the manufacturer as qualified to install treatment in accordance with manufacturer's warranty requirements.
     2. Manufacturer's Qualifications: Formulates synthetic type treatments for vapour emission and alkalinity control installations of similar size and complexity with the system proposed for use.
  6. DELIVERY, STORAGE AND HANDLING
     1. Deliver materials to site in manufacturer's original, unopened, undamaged containers with identification labels intact.
     2. Store materials in a dry, secure area protected from exposure to harmful weather conditions and at temperature levels as recommended by manufacturer.
  7. FIELD CONDITIONS
     1. Environmental Limitations: Comply with vapour-control flooring treatment manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting vapour-control flooring treatment application.
     2. Do not install vapour-control flooring treatment until installation areas are enclosed and conditioned.
        1. Do not apply vapour-control flooring treatment to unprotected surfaces, or when water is accumulated on the surface of the concrete.
        2. Do not apply vapour-control flooring treatment when temperature is lower than, 10 deg C (50 deg F) or expected to fall below this temperature within twenty-four (24) hours from time of application.
        3. Allow continuous ventilation and indirect air movement at all times during application and curing process of treatment.
     3. Close spaces to traffic during vapour-control flooring treatment application and for not less than twenty-four (24) hours after application unless manufacturer recommends a longer period.
  8. WARRANTY
     1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace materials that fail in material or workmanship specified in "Performance Requirements" Article within specified warranty period.
        1. In the event moisture vapour emission rates exceed specified requirement during warranty period and cause flooring system damage, manufacturer and installer shall provide complete repair and replacement of damage flooring at no cost to Owner.
        2. Repair shall include new flooring, adhesives, patching compounds, required accessories and labor charges to provide an acceptable, Owner-approved flooring system.
        3. Installer shall warrant that installed system is compatible with specified flooring, and specified floor coverings require no additional cementitious materials, special adhesives, or reapplications of system components at additional charge to Owner. Finish flooring installation shall remain standard for all specified flooring.
     2. Warranty Period: Ten (10) years from date of Substantial Completion.

1. Products
   1. materials
      1. General: Non-corrosive, non-toxic, non-flammable, non-combustible and not labeled as a marine pollutant in liquid or mixed form.
      2. Source Limitations: Obtain components and accessories of concrete moisture-vapour control system through one source from a single manufacturer.
   2. PERFORMANCE REQUIREMENTS
      1. General: Provide proprietary, synthetic polymer capable of penetrating concrete surfaces and forming a dense, non-removable, seamless membrane to reduce water vapour emissions levels and alkali salts, avoid water vapour damage to other adhered systems, and resistant to most commonly encountered acids/solvents in case of topical spills.
      2. Application of treatment shall reduce water vapour emission to 2 lb of water/1000 sq. ft. (0.91 kg of water/92.9 sq. m) in twenty-four (24) hrs per ASTM F 1869, remain resistant to alkaline pH levels of 14 per ASTM F 710, and resistant to finish flooring delamination.
      3. System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated:
         1. Water Vapour Transmission (Wet Method): 95 percent vapour reduction compared to untreated ACI Committee 201 durable concrete samples per ASTM E 96.
         2. Chemical Resistance, 14pH: 100 percent tolerant, 30-day exposure per ASTM D 1308.
         3. Adhesion Strength: 100 percent concrete cohesive failure per ASTM D 4541.
         4. Post Moisture Testing Results: Capable of controlling 42.0 lbs to 2.0 lbs of water/1,000 sq. ft in 24 hr (19.05 kg to 0.91 kg of water/92.9 sq. m) per ASTM F 1869.
         5. Chemical Resistance, 30 days: Tolerant to 35 percent potassium hydroxide per ASTM D 1308.
         6. In-Situ Relative Humidity: Tolerant to 100 percent exposure per ASTM F 2170.
      4. Regulatory Requirements: Conform to regulation of California Air Resource Board and local air quality/air pollution control district regarding VOC content.
   3. VAPOUR-CONTROL MEMBRANE
      1. Vapour-Control Membrane: Two-component, multi-coat application of a breathable fluid-applied membrane compatible with types of floor covering products indicated; no system failures due to improper installations, and contain no water/alkaline soluble compounds.
         1. Basis of Design Materials:
            1. Diamond Stone Products, Inc.; Diamond-VRS.
            2. Floor Seal Technology, Inc.; System 6.
            3. Koester VAP 1 2000; Koester American Corporation.
            4. Synthetics International; Synthetic 30.
         2. Primers: Non-porous primer for securing cement topcoat products recommended by vapour control membrane manufacturer and compatible with underlayment and membrane.
      2. VOC Content: Liquid floor treatments shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Execution
   1. EXAMINATION
      1. Prior to preparation of the Work under this Section, examine installed Work executed under other Sections which affect execution of work under this Section.
      2. Moisture Testing Procedures: Perform the following tests to determine if vapour-control flooring treatment is required.
         1. Testing Conditions: Do not conduct moisture testing until final building environmental conditions have been achieved. Maintain temperature between 18.3 to 29.4 deg C (65 to 85 deg F) and relative humidity between 40 to 60 percent for not less than seventy-two (72) hours prior to and throughout duration of testing.
         2. Perform concrete testing to determine conditions at a minimum of three tests for the 1000 sq. ft. and one (1) additional test for each 1000 sq. ft. thereafter for each of the following methods:
            1. Water Vapour Transmission: Not to exceed 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in twenty-four (24) hours per ASTM F 1869.
            2. Internal Relative Humidity: Not to exceed 75 percent RH per ASTM F 2170.
            3. Digital Alkalinity-pH: Not to exceed 9.0 pH per ASTM F 2170.
            4. Provide test results with map of test locations and recommendations to the Consultant prior to installation of finish flooring.
      3. Upon receipt of written approval from Consultant to proceed with Work specified in this Section, examine substrates, areas, and conditions, with installer present, for compliance with requirements and conditions affecting performance of the Work.
         1. Verify that surfaces are clean and dry according to water-repellent manufacturer's requirements.
         2. Inspect for previously applied treatments that may inhibit penetration or performance of vapour control flooring treatment.
         3. Verify that required repairs are complete, cured, and dry before applying treatment.
         4. Proceed with application only after unsatisfactory conditions have been corrected.
   2. PREPARATION
      1. Coordinate work under this Section with Work specified under other Sections to ensure proper and adequate interface of Work.
      2. Protectadjacent surfaces from drips, spray, damage to walls and base, air pollution of surrounding environment, and other damage from work under this Section.
      3. Surface Preparation:
      4. Investigate and inform the treatment manufacturer if concrete additives such as chlorides, plasticizers, or other soluble compounds that can contaminate surfaces have been used in concrete mix.
      5. Before application of flooring treatment, clean substrate of substances that could impair penetration or performance of product according to flooring treatment manufacturer's written instructions.
      6. Shot-blast floors, using #420 shot, to remove defective materials and foreign matter such as dust, adhesives, leveling compounds, paint marks, dirt, floor hardeners, paint overspray, bond breakers, oil, grease, curing agents, form release agents, efflorescence, laitance, moisture testing adhesives and steel shot.
      7. Repair cracks, expansion joint, control joints, and open surface honeycombs and fill in accordance with manufacturer's recommendations.
      8. Provide an uncontaminated, absorptive, sound surface. Do not acid etch.
      9. Vacuum surfaces clean prior to application. Do not use clean sweeping agents, dust absorbers or chemical agents to clean concrete.
   3. APPLICATION
      1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of flooring treatment and to instruct installer on the product and application method to be used.
      2. Apply in accordance with manufacturer's instructions and recommendations, unless specifically noted otherwise.
         1. Comply with regulatory requirements.
         2. Close areas to traffic during application and for time period after application recommended in writing by manufacturer.
      3. Apply treatment with manufacturer's representative present.
      4. Cure treatment according to manufacturer's written instructions. Prevent contamination during application and curing processes.
      5. Do not install floor coverings over treatment until after time period recommended in writing by vapour-control flooring treatment manufacturer.
   4. FIELD QUALITY CONTROL
      1. Testing and Inspection: Engage a qualified testing and inspection agency to perform the following:
         1. Schedule inspections and notify the Consultant, and other regulatory agencies, if any, of the time at least forty-eight (48) hours prior to the inspection.
         2. Validation Testing:
            1. After application of the treatment, test interior concrete floor surfaces scheduled to receive the vapour-control flooring treatment to establish system performance.
            2. Testing agency to provide validation calcium chloride testing of treated floor areas designated in accordance with ASTM F 869 once the specified system has been installed.

At a minimum, test interior slab-on-grade surfaces prior to finish flooring installation and after the spaces to receive finish flooring are brought to an environmental condition matching the designated conditions of use.

Provide test kits at the rate of three kits per 1000 sq. ft. and one additional test kit for each additional 1000 sq. ft. or portion thereof; and for validation testing, provide one test kit placed beside every sixth test kit.

* + - * 1. Digital Alkalinity pH Testing: Testing agency shall conduct pH test at each calcium chloride test.
        2. Vapour emission test readings shall satisfy the manufacturer's published requirements of the finish flooring to be installed. Common acceptable criteria require that vapour emissions not exceed 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in twenty-four (24) hours, although various manufacturers' actual requirements may vary.
        3. Once test results are known, copies shall be given to Consultant, Contractor, and Owner.
    1. If the validation test vapour emission and pH readings exceed the requirements of the finish flooring manufacturer, provide remedial materials and labor, at no additional cost to the Owner, to bring vapour emissions and pH within acceptable limits.
  1. CLEANING AND PROTECTION
     1. Immediately clean vapour-control flooring treatment from adjoining surfaces and surfaces soiled or damaged by flooring treatment application as work progresses. Correct damage to work of other trades caused by flooring treatment application, as approved by Consultant.
     2. Comply with manufacturer's written cleaning instructions.
     3. Provide finish, clean and ready for the application of finish flooring.
     4. Protect each coat during specified cure periods from traffic, topical water, and contaminants.

END OF SECTION