Section 09 96 66

Water Vapor Emission Control Systems

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, documents, and general provisions of the Contract, including, but not necessarily limited to, General Conditions and Division 1 Specification Sections, apply to this Section.

B. Related Sections- Coordinate work of this Section with work of other Sections to properly execute the work requirements and maintain satisfactory progress of work in other Sections.

1. Section 03 06 30: Cast-In Place Concrete Installation and curing requirements according to ACI 302.
2. Section 09 62 00: Specialty Flooring, Installation requirement.
3. Section 09 64 00: Wood Flooring, Installation requirement.
4. Section 09 65 00: Resilient Flooring, rubber sheet and vinyl tile installation requirements.
5. Section 09 65 36: Static Control Flooring, Installation requirements.
6. Section 09 67 00: Fluid Applied Flooring, Installation requirements.
7. Section 09 68 00: Carpet, Installation requirements.

1.2 SUMMARY

A. This Section includes the furnishing, testing, and application of systems for the reduction of moisture vapor transmission and alkalinity control for Interior concrete slabs requiring the installation of VCT, vinyl flooring, rubber flooring, wood, carpet, and/or epoxy flooring systems.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the requirements and Conditions of the Contract in Division 1. Specification Sections.

B. Product data for each type of product and process specified which shall include:
1. Manufacturer’s Specification
2. Installation Instructions
3. Independent Test Data
4. Certification Requirements
5. Warranty Information

C. Submit anhydrous calcium chloride testing according to ASTM F 1869 (latest revision) and/or RH Probe Test according to ASTM F 2170 (latest revision). Tests shall be performed by the Independent Inspector and results provided to the Architect, Owner, General Contractor, and Water Vapor Reduction System Manufacturer's Representative.

1.4 QUALITY ASSURANCE

A. Qualifications of Applicator

1. Employ an Applicator currently approved by the manufacturer, experienced in surface preparation and application of the material and subject to inspection of the manufacturer.

B. Manufacturer’s Qualifications

1. Manufacturer shall have no less than ten (10) years experience in manufacturing water vapor reduction systems. The water vapor reduction system must be specifically formulated and marketed for water vapor reduction and alkalinity control without change of system design for a minimum period of five (5) years.

2. Manufacturer shall provide the Owner with their standard ten (10) year warranty at no additional cost. Applicator of water vapor reduction system shall provide standard installation warranty for workmanship.

3. Manufacturer must provide independent lab test reports documenting performance per the following:

a. ASTM E 96, Water Vapor Transmission (wet method) Performance shall be documented by an independent testing laboratory at a minimum of 97% water vapor transmission reduction compared to untreated concrete.
b. ASTM E96- Perm Rating - Standard Test Method for Water Vapor Transmission of Materials – Perm Rate results must not exceed 0.1 Perms (when tested under laboratory conditions).

c. Certify acceptance and exposure to continuous topical water exposure after final cure.

4. Submit list of product use and performance history, for the same formulation and system design, listing reference sources for at least 3 projects dating back for a minimum of 5 years.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver products to the job site in their original unopened containers, clearly labeled with the manufacturer's name and brand designation.

B. Store products in an approved ventilated dry area; protect from dampness, freezing, and direct sun light. Product should not be stored in areas with temperatures in excess of 90° F or below 50° F.

C. Handle product in a manner that will prevent breakage of containers and damage products.

1.6 PROJECT/SITE CONDITIONS

A. ENVIRONMENTAL CONDITIONS

1. Do not apply moisture vapor reduction system to surfaces that may be exposed to excessive weather conditions (such as rain, wind, etc) until the material has fully cured, or when water is accumulated on the surface of the concrete. Protect freshly applied coating accordingly when material is applied outdoors.

2. Do not apply water vapor reduction system when temperature is lower than 50°F or expected to fall below this temperature within 24 hours from time of application.

B. **PROTECTION**: Protect water vapor reduction system to prevent damage from active rain or topical water for a minimum period of 24 hours from time of application.

1.7 SCHEDULING

A. Before installation of VCT, sheet vinyl, rubber flooring, wood, carpet and/or epoxy flooring systems over the interior concrete slabs, anhydrous calcium chloride testing ASTM F 1869 (latest revision) and/or RH Probe Tests ASTM F 2170 shall be performed by the Independent Inspector as outlined In Article 3.1 below.

B. The Independent Inspector will coordinate with the Owner scheduling water vapor reduction system testing and allowing enough time to test, submit and install the water vapor reduction system before installation of floor finish.

C. The Independent Inspector will allow for as much time as is reasonable for the concrete slab to dry before installing anhydrous calcium chloride tests and/or RH Probe Tests. All mastics, glues, and/or contaminants shall be removed to provide a clean, sound, concrete substrate prior to installing anhydrous calcium chloride tests as per ASTM F 1869 (latest revision).

D. The water vapor reduction system must allow installation as early as 7 days after concrete placement.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Water vapor reduction system, which may be incorporated in the work, shall be the product of a single manufacturer, no substitutions. Manufacturer's offering approved products:

1. KOSTER VAP I® 2000 UFS System by KOSTER American Corporation;
Corporate Headquarters: 2585 Aviator Drive, Virginia Beach, VA 23453
Phone: (757) 425-1206 – Fax: (757) 425-9951
Web address: www.kosterusa.com

B. Terminology hereafter is based upon the products of KOSTER American Corporation.

2.2 MATERIALS

A. General: Use materials of one manufacturer throughout the project as hereinafter specified.
1. System consists of one (1) coat of KOSTER VAP I® 2000 UFS. The Owner shall specify a floor covering system and adhesive having the ability to withstand water vapor transmission levels up to 3lbs/1000 ft^2/24 hr. The water vapor reduction system shall be required to reduce water vapor emissions by a minimum of 97% after final cure, as well as alkalinity reduction

to acceptable pH levels.

B. 100% solids KOSTER VAP I® 2000 UFS epoxy coating, containing specifically formulated chemicals and resins to provide the following characteristics and properties in a one coat system. No multi-coat systems are allowed. System must contain 100% solid epoxy system.

1. ASTM E 96, Water Vapor Transmission (wet method) Performance shall be documented by an independent testing laboratory at a minimum 97% for water vapor transmission reduction compared to untreated concrete.
2. ASTM E 96 Permeance Rating – product cannot exceed a 0.1 permeance rating (when tested under laboratory conditions).
3. Certify acceptance and exposure to continuous topical water exposure after final cure.
4. Water Vapor reduction system shall be a single coat, stand alone system with no requirements for additional components such as sand broadcast for adhesion of flooring systems.
5. System must reduce Calcium Chloride readings of up to 25lbs/1000 ft^2/24 hrs by 97% in one coat. System must be able to perform as required with RH Probe readings of 100%.

C. KOSTER VAP I® 06 Primer –(non-porous substrate primer)

2.3 AREA NOT REQUIRING VAPOR REDUCTION SYSTEM

A. Anhydrous calcium chloride testing and/or RH Probe Tests performed by the Independent Inspector for interior concrete slab areas receiving VCT, sheet vinyl, rubber flooring, wood, carpet, and or epoxy flooring systems will determine where this system may be required. Water vapor reduction system may be required on concrete floors with water vapor transmission level in excess of 3 lbs/1000 ft^2/24 hr or 5 lbs/1000 ft^2/24 hr for some specific flooring systems (verify with flooring system manufacturer.) RH Probe Test results of 75% or higher requires the installation of the vapor reduction system.

B. Water vapor reduction system is not required on interior concrete slabs without floor finishes.

PART 3 – EXECUTION

3.1 EXAMINATION OF SUBSTRATE BEFORE APPLICATION

A. Calcium Chloride and/or RH Probe test requirements:

1. Anhydrous calcium chloride testing shall be performed by the Independent Inspector as outlined in Section 01410 - Quality Requirements.
2. Provide anhydrous calcium chloride tests according ASTM F 1869 (latest revision) protocols. Provide RH Probe Tests according to ASTM F 2170 protocols.
3. Only conduct calcium chloride tests at the same temperature and humidity expected during normal use. If this is not possible, then the test conditions should be 75°F +/-10°F and 50% (+/-10%) relative humidity. Maintain these conditions 48 hours prior to and during testing. Water vapor transmission levels are directly affected by ambient room temperature and readings conducted without a sustained ambient temperature are NOT acceptable.
4. The Independent Inspector shall provide test results with a marked up floor finish plan showing test results. The Independent Inspector shall provide a written clarification on status of the ambient air temperature and humidity before and during the testing procedures.

B. Testing for contaminants that inhibit adhesion

1. On existing slabs (primarily), testing for concrete deficiencies and contaminates such as un-reacted water-soluble silicates, chlorides, A.S.R. (alkali-silica reaction), oil contamination, etc. is strongly recommended by KOSTER to avoid bonding issues. These conditions may cause bonding concerns with all epoxy and finished floor coatings, including the KOSTER VAP I® 2000 UFS. This testing should be performed by the owner's independent testing agency using standard coring methods. Also, the history of the slab installation should be reviewed. Concrete should conform to ACI Committee 201 Report "Guide to Durable Concrete."

C. Testing adhesion of the final flooring to the vapor barrier:

1. The Independent Inspector shall verify proper adhesion of flooring adhesives, coatings, and leveling compounds to the final vapor reduction coating system for acceptability. Contact Manufacturer's Representatives for recommendations.

3.2 PREPARATION

A. Inspect all surfaces with regard to their suitability to receive moisture vapor reduction system with manufacturer's representative.

B. Clean all surfaces to receive moisture vapor reduction system. Shot blast all floors to a Concrete Surface Profile (CSP) #3 or #4 and clean surfaces with an industrial vacuum cleaner and remove all residues from the substrate. Grinding is allowed only in areas not accessible by shot blasting. Remove ALL defective materials, and foreign matter such as dust, adhesives, leveling compounds, paint, dirt, floor hardeners, bond breakers, oil, grease, curing agents, form release agents, efflorescence, laitance, shot blast beads, etc. Repair all cracks, expansion joints, control joints, and open surface honeycombs and fill in accordance with Manufacturer's recommendations. If concrete additives such as chlorides or any other water-soluble compounds that may contaminate surfaces have been used in the concrete mix do not use this product on that floor without written approval from KOSTER American Corporation. Reinforcing fibers that are visible after shot blasting must be removed and vacuumed leaving no fibers left on the concrete surfaces. **Provide an uncontaminated, sound surface. DO NOT ACID ETCH!**

C. Repair concrete prior to moisture vapor reduction system installation by using KOSTER SB Bonding Emulsion with approved concrete repair materials. Comply with all requirements as listed in Manufacturer's technical data information. Consult with vapor reduction manufacturer.

D. Ensure surfaces to be treated with moisture vapor reduction system have NOT previously been treated with other materials such as underlayments, screeds, penetrating sealants, silicates**,** etc. If this is the case, consult with the Manufacturer's Representative prior to any application of moisture vapor reduction system.

E. Any testing for concrete deficiencies or contamination such as alkali silica reaction, unreacted silicates, organic residue, etc. is recommended and is the responsibility of the Building owner.

F. Shot blast a small test area and review surface profile with the finished flooring applicator. As the KOSTER VAP I® 2000 UFS is not a leveling material, make sure the flooring installer is aware that a feather finish or leveling material may be required to smoothen or level the surface of the KOSTER VAP I® 2000 UFS treated concrete prior to the flooring installation.

3.3 MIXING

A. Use clean containers and mix thoroughly as per Manufacturer's requirements to obtain a homogeneous mixture. Use a low speed motor less than 400 rpm and a two bladed Jiffy-type mixing blade only. DO NOT AERATE. Mix ratios are measured by volume.

B. KOSTER VAP I® 2000 UFS Mix Ratio: Mix Component A and B at a ratio of 2:1 by volume.

3.4 APPLICATION

A. **KOSTER VAP I® 2000 UFS System Application:**

The coverage rates for this Single Coat system depends on the surface profile and porosity of the concrete substrate as well as the measured level of moisture, from Section 3.1 Examination. On average, a coverage rate of 100-150 ft^2/gal. may be expected. (See additional application instructions in KOSTER technical data sheets for specific coverage rates.)

B. **After mixing, pour material on the substrate in a ribbon. Empty can completely.**

C. Spread KOSTER VAP I® 2000 UFS using a squeegee and back-roll with a 3/8 inch nap epoxy-rated roller leaving NO areas untreated.

D. Allow to cure a minimum of 2.5 hours before installing flooring system.

E. After shot blasting and installation of the KOSTER VAP I® 2000 UFS vapor reduction system, a self-leveling cementitious underlayment system or patching compound may be used in conjunction with the KOSTER VAP I® 06 Primer (if required by the Owner, floor covering installer, or floor covering manufacturer to smoothen or level surfaces). Never apply KOSTER VAP I® 2000 UFS over any new or existing cementitious underlayment system (especially if it is **calcium sulfate based),** unless approved in writing by the KOSTER American Technical Staff, (**no exceptions**).

F. When water based adhesives are used in the floor covering installation, use an approved underlayment system together with a non-porous substrate primer prior to the installation of the flooring system. Please consult the adhesive manufacturer for their minimum recommended thickness of cementitious underlayment to absorb excess moisture in the adhesive. Note: this applies only to certain water based adhesives. Most adhesives will bond directly to the KOSTER VAP I® 2000 UFS. Consult with KOSTER American Corporation for general guidelines.

3.4 CLEANING

A. Clean all tools and equipment with Xylene (or similar material) immediately after use when using the KOSTER VAP I® 2000 UFS.

B. Remove all debris resulting from water vapor reduction system installation from project site.

3.5 PROTECTION

A. Protect each coat during specified cure period from any kind of traffic, topical water and contaminants.

END SECTION 09 96 66