

SECTION 09601

OIL RESISTANT COATING SYSTEM FOR CONTAMINATED CONCRETE FLOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Oil resistant coating system for contaminated concrete slabs.

1.2 RELATED SECTIONS

- A. Section 03300 - Cast-In Place Concrete: Installation and curing requirements according to ACI 302.
- B. Section 09699 – Water Vapor Emission Control System: Top coating system required where Initial moisture vapor transmission test results exceed 6 lb/1000 sf (2.9 kg/100 sq. m) /24 hour period.

1.3 REFERENCES

- A. American Society of Testing and Materials (ASTM):
 1. C 96 – Standard Test Methods for Water Vapor Transmission of Materials.
 2. E 1907 – Standard Practices for Determining Moisture-Related Acceptability of Concrete Floors to Receive Moisture-Sensitive Finishes.
 3. F 1869 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Floor Using Anhydrous Calcium Chloride.
- B. International Concrete Repair Institute (ICRI) Guideline No. 03732; Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings and Polymer Overlays.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 1. Manufacturer's specification.
 2. Installation instructions.
 3. Certification requirements.
 4. Warranty information.
- C. Pre-Construction Testing:
 1. Submit anhydrous calcium chloride test results performed according to ASTM F 1869. Test shall be performed by the Owner and submitted to the Architect, General Contractor, Applicator and Oil Removal System Manufacturer's Representative.
 2. Submit data set generated by core sample analysis as determined by an independent laboratory and submitted to the Architect, General Contractor, Applicator and Oil Removal System Manufacturer's Representative. Testing to be performed will be the appropriate testing for hydrocarbon contamination in concrete such as; X Ray

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Manufacturer shall have no less than five years experience in manufacturing oil resistant coating systems. The oil resistant coating system shall be specifically formulated and marketed for oil resistance and alkalinity control. System design shall not have changed for a minimum of five consecutive years prior to start of the work.
- B. Installer Qualifications:
 - 1. Employ an Applicator currently approved or certified by the manufacturer, experienced in surface preparation and application of the material specified and shall be subject to inspection and control by the manufacturer.
 - 2. Installer shall have no less than five years of experience installing the resin-based, fluid applied coating systems.
- C. Product Performance History:
 - 1. Manufacturer shall provide independent lab test reports documenting performance per the following:
 - a. ASTM E 96, Water Vapor Transmission (wet methods) Performance shall be documented by an independent testing laboratory indicating a minimum of 50 percent water vapor transmission reduction compared to untreated concrete.
 - b. ASTM D 1308; Insensitivity to alkaline environment up to pH 14.
 - 2. Submit list of product use and performance history, for the same formulation and system design, listing reference sources. Similar projects shall have documented minimum initial water vapor transmission rates of 6 lb per 1000 sf (2.9 kg/100 sq. m) per 24 hours to 3 lb per 1000 sf (1.5 kg/100 sq. m) per 24, and have resulted in 50 percent reduction of maintained water vapor reduction of less than 3 lb per 1000 sf (1.5 kg/100 sq. m) per 24 hours when tested according to ASTM F1869-98.
- D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
 - 3. Refinish mock-up area as required to produce acceptable work.

1.6 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 degrees F (32 degrees C) or below 50 degrees F (10 degrees C).
- C. Handle product in a manner that will prevent breakage of containers and damage products.

1.7 PROJECT CONDITIONS

- A. The Owner shall select a floor covering system scheduled for the treated concrete substrate having the ability to withstand water vapor transmission levels up to 3 lb per 1000 sf (1.5 kg/100 sq. m) /24 hours.
- B. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
 - 1. Do not apply oil resistant coating to unprotected surfaces or over standing water on concrete surfaces. Surfaces shall be wet or damp with all excess water removed by vacuuming.
 - 2. Do not apply the oil resistant coating when temperature is lower than 50 degrees F (10 degrees C) or expected to fall below this temperature 24 hours from time of application.
 - 3. Do not apply the oil resistant coating when temperatures exceed 90 degrees F (32 degrees C) or ambient humidity levels are in excess of 85 percent.
 - 4. Allow continuous ventilation and indirect air movement at all times during application and curing process of the oil resistant coating.
 - 5. Verify surface conditions are not at the dew point prior to start of application.
 - 6. Protect oil resistant coating system to prevent damage from active rain or surface water or freezing conditions for a minimum period of 24 hours from time of application.

1.8 WARRANTY

- A. Manufacturer shall provide the Owner with their standard ten year warranty at no additional cost.
- B. Applicator of oil resistant coating system shall provide standard installation warranty for workmanship.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Koester American Corporation; 2585 Aviator Dr., Virginia Beach, VA 23453. ASD. Tel: (757) 425-1206. Fax: (757) 425-9951. Email: info@koesterusa.com. Web: <http://www.koesterusa.com>.
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01600.
- D. Provide materials of one manufacturer throughout the project.

2.2 SYSTEM

- A. Oil Resistant Coating System: In depth Oil Decontamination Detergent, with applied Oil Resistant Primer top coat.
 - 1. The application consists of two applications of the Oil Decontamination Detergent and one coat of the Oil Resistant Primer to be applied to a properly prepared concrete surface.
- B. Oil Decontamination Detergent:

1. Product: VAP-1 ORS D as manufactured by Koester American Corporation.
 2. Physical Properties:
 - a. Color: Clear.
 - b. VOC Compliant: 0.0 gm/L.
- C. Oil Resistant Primer:
1. Product: VAP-1 ORS C as manufactured by Koester American Corporation.
 2. Physical Properties:
 - a. Consistency: Approximately 800 MPa.
 - b. Mixing Ratio: 8.33:1 (A: B by weight) (4:1 by volume).
 - c. Pot Life: 1 hour at 70 Degrees F (21 degrees C).
 - d. Compressive Strength: 80 N/mm.
 - e. Specific Gravity: 2 gm/cu. cm.
 - f. Flash Point: 203 Degree F (95 degree C).
 - g. Solid Content: 98 percent.
 - h. VOC: 4 gm/L.
 - i. Color: Gray.
- D. Substrate Primer: Water based one component resin system for priming absorbent and non-absorbent substrates.
1. Product: VAP-1 06 Primer as manufactured by Koester American Corporation.
 2. Physical Properties:
 - a. Flash Point: None. Non-Flammable, Non-Explosive.
 - b. Color: Light green. Dries transparent green.
- E. Cementitious Underlayment System: High strength fast curing self-leveling underlayment designed to level uneven concrete surfaces on interior slabs to provide an acceptable finish for flooring systems.
1. Product: Level Pro as manufactured by Koester American Corporation.
 2. Physical Properties:
 - a. Compressive Strength (ASTM C 109 - Air Cured): 4 hours - 1450 psi (10 MPa), 16 hours - 2550 psi (17.6 MPa), 1 day - 2900 psi (20 MPa), 7 days - 3550 psi (24.5 MPa), 28 days - 4550 psi (31.4 MPa).
 - b. Flexural Strength (ASTM C 348): 7 days - 750 psi (5.2 MPa), 28 days - 1150 psi (7.9 MPa).
 - c. Tensile Strength (ASTM C 190): 1 day - 340 psi (2.3 MPa), 7 days - 400 psi (2.8 MPa), 28 days - 460 psi (3.2 MPa).
- F. Cementitious Underlayment System: A rapid curing, trowel-applied underlayment for thin-finish applications.
1. Product: Level Pro Finish as manufactured by Koester American Corporation.
 2. Physical Characteristics:
 - a. Compressive Strength (ASTM C 109 Air Cured): 24 hours - 2100 psi (14.5 MPa), 7 days - 2800 psi (19.3 MPa), 28 days - 4700 psi (32.4 MPa).
- G. Bonding Emulsion: A carboxylated styrene butadiene copolymer latex designed to be used as an additive for hydraulic crack repair cement mortars.
1. Product: SB Bonding Emulsion as manufactured by Koester American Corporation.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Inspect surfaces with manufacturer's representative to determine its suitability to receive the moisture vapor reduction system. Provide an uncontaminated, sound surface.
- B. Inform coating manufacturer if concrete additives such as chlorides or other soluble compounds that can potentially contaminate surfaces have been used in the concrete mix.
- C. Shot blast floors to CSP-3 or CSP-4 (ICRI Guideline No. 03732). Remove surface 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 and shot blast bee bees.
- D. Do not acid etch.
- E. Repair cracks, expansion joint, control Joints, and open surface honeycombs.
 - 1. Use Bonding Emulsion with approved concrete repair materials. Comply with requirements listed in manufacturer's technical data information. No exceptions. Consult with vapor reduction manufacturer.

3.3 APPLICATION

- A. Detergent clean concrete slab using the Oil Decontamination Detergent in accordance with ICRI 03732 guidelines. Apply detergent to the entire area using a foam-gun supplied by manufacturer. Allow the foam to penetrate and disperse to a clear liquid condition or approximately 1 hour. Follow with the deep clean procedure of the entire floor area with a high pressure floor spinner capable of 5 gpm (19 lpm) delivery at 5000 psi (34.5 mPa), 180 degrees F (82 degrees C) water. Vacuum and contain wastewater. Repeat cleaning procedure as necessary. Dispose of containment water in accordance with local, state, and federal regulations, standards and requirements.
 - 1. The application rates for the detergent are dependant on the surface texture and porosity of the substrate.
 - 2. A spread rate of 350 to 400 sf/gallon (8.6 sq. m/l to 9.8 sq. m/l) is the approximate spread rate depending on levels of contamination as determined by core testing and initial measured levels of moisture.
- B. Apply one coat of Oil Resistant Primer at a spread rate of 100sq ft/gallon (2.5 sq. m/l) using an appropriate squeegee then back roll using a 3/8 inch (9.5 mm) nap roller leaving no areas untreated. After a 15-20 minute wait, depending on ambient temperature, broadcast silica sand to rejection into wet coating at an approximate rate of 1/2 to 3/4 lb/sf (2.5 to 3.7 kg/sq. m). Use only washed and dried silica sand, mesh (sieve) size 30 to 50. Allow coating to cure a minimum of 12 hours before removing excess sand. **DO NOT USE "PLAY SAND"**; use only a good quality cleaned and dried broadcast type sand.
 - 1. Do not allow the material to pond or puddle in recesses, depressions or holes present in substrate. Brush out all excess material to maintain consistent thickness.
- C. Cementitious Underlayment System: Provide the Cementitious Underlayment System with the non-porous Substrate Primer:

1. Substrate Primer: Application rate of approximately 450 to 600 sf/gallon (11 sq. m/l to 15 sq. m/l). Coverage rates are dependent upon substrate condition.
 - a. Very porous surfaces may require two coats. Leave no bare spots. Avoid puddling and excess accumulations; apply a thin coat. Heavy, thick applications are detrimental to the cementitious underlayment products.
 - b. Allow to dry to a light green, transparent film, 1-2 hours at an ambient temperature of 70 degrees F (21 degrees C) and relative humidity of 50 percent.
 - c. The subsequent application of cementitious products shall be within 2 days. Subsequent application of overlaying products may proceed as soon as the primer is dry.
2. Self-Leveling Cementitious Underlayment:
 - a. Self leveling with no troweling needed when applied at 70 degrees F (21 degrees C). Pour the underlayment product on the floor and disperse with the approved spreader, followed by smoothing the material with the approved smoother. Cleated shoes shall be worn to avoid leaving marks.
 - b. Maximum application thickness of 1-1/2 inches (38 mm) in one layer.
3. Trowel Applied Cementitious Underlayment:
 - a. Troweled from a minimum 80 mils (2 mm) to a maximum of 1/2 inch (13 mm) thick in one layer.
4. Alternate Approved Equal Underlayment System: If required by the Owner, flooring installer or the flooring manufacturer an alternate approved equal underlayment system may be used to level surfaces applied over the water reduction system. The alternate underlayment system shall be tested and approved (no exceptions) by the manufacturer of the water vapor reduction system prior to installation. The underlayment system shall not contain gypsum.

3.4 TESTING

A. Initial Tests:

1. Anhydrous calcium chloride testing shall be performed by the Owner.
 - a. Provide initial anhydrous calcium chloride tests according ASTM F 1869 – 98 to the prepared concrete surfaces. Tests shall be performed on properly prepared concrete. No exceptions!
 - b. Conduct calcium chloride tests at the same temperature and humidity as designed normal occupancy. If this is not possible, test conditions shall be 75 degrees F +/-10 degrees (24 degree C +/- 5 degrees) and 50 percent +/-10 percent relative humidity. Maintain these conditions 48 hours prior to and during tests. Water vapor transmission levels are directly affected by ambient room temperature and readings conducted without a sustained ambient temperature are not acceptable.
2. Concrete Core Data Set:
 - a. Conduct X-ray diffraction (XRD) analysis which includes the evaluation of the concrete solids via energy dispersive x-ray analysis (EDXA) 0-4 mm BTC profile – (Below Top of Core Surface).
 - b. Conduct Infra-red (IR) spectroscopy which is the organic chemical analysis, 0-4 mm BTC profile.
 - c. Conduct Ion Chromatography (IC) analysis which is the analysis of water-soluble CL, SO₄, K & Na 0-4 mm BTC profile.
3. Owner shall provide test results with a marked up floor finish plan showing test results. Owner shall provide a written clarification on status of the ambient air temperature and humidity before and during the testing procedures.
4. Owner shall provide a marked up floor plan showing areas with vapor reduction system recommendations.

- B. Post Treatment/Pre Flooring Tests:
 - 1. Before installation of VCT, sheet vinyl, rubber flooring, wood, carpet, and / or epoxy flooring systems and after proper cure of the final coat of the oil resistant coating system provide anhydrous calcium chloride tests according ASTM F 1869. Moisture mitigation system must cure 72 hours before testing. Water vapor transmission and alkalinity tests shall be performed on properly treated concrete. No exceptions!
 - 2. The Owner shall provide test results of the level of water vapor transmission and alkalinity of the concrete slab to all parties involved. The flooring manufacturer and installer shall accept the floor condition and certify that the flooring application materials and methods are compatible with the test results and floor condition.

- C. Adhesion Tests:
 - 1. The flooring installer shall verify proper adhesion of flooring adhesives, coatings, and leveling compounds to the final vapor reduction coating system.

3.5 PROTECTION

- A. Protect the coating during specified cure period from traffic, surface water and contaminants.
- B. Protect installed products until completion of project.
- C. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION