



## Section 03 01 37

# Concrete Slab Moisture Emissions Remediation

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*This section specifies remediation of concrete slabs out of conformance to moisture vapor emissions and percent relative humidity at core of concrete slab (generally exceeding 75%). Work of this section is not required in new work except where testing shows that new concrete slab moisture emissions, relative humidity, or pH levels are unacceptable for subsequent finish flooring systems. Edit this system for remediation in renovation work where existing slabs are open to moisture at the bottom of the slab.*

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### Part 1 - General

#### 1.01 Summary

##### A. Section Includes

Procedures for remediation of unacceptable moisture vapor emissions and alkalinity levels at concrete slabs.

##### B. Related Requirements

1. Section 033000 - Cast-In-Place Concrete
2. Section 035416 - Hydraulic Cement Underlayment
3. Section 096766 - Fluid-Applied Polyurethane Sports
4. Section 96466 - Wood Athletic Flooring
5. Section 096513 - Resilient Sheet Flooring
6. Section 096516 - Resilient Linoleum Sheet Flooring
7. Section 096519 - Resilient Tile Flooring
8. Section 096800 - Carpet

#### 1.02 Price and payment procedures

- A. Allowances: Refer to Section 012100 - Allowances for effect on work of this Section.
- B. Unit Prices: Refer to Section 012200 - Unit Prices for effect on work of this Section.
- C. Alternates: Refer to Section 012300 - Alternates for effect on work of this Section.



### 1.03 References

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**Edit reference standards to those referenced in body of specification section.**

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#### A. Reference Standards

Conform to provision of Section 014219.

#### B. ASTM International (ASTM)

1. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials
2. ASTM C1583 - Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength of Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method)
3. ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes
4. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
5. ASTM D7234 - Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers
6. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
7. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
8. ASTM F1310 - Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings
9. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using *in situ* Probes.

#### C. International Concrete Repair Institute (ICRI)

ICRI Technical Guideline No. 310.2-1997 (formerly No. 03732) – Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.

### 1.04 Administrative requirements

#### A. Coordination

1. Conform to Section 013113 for coordination with work of other Sections.
2. Section 033000 for moisture and pH testing requirements, concrete substrate free of curing agents, acid washes, and bond breakers.
3. Related finish flooring systems for adhesives and surfaces compatibility with Moisture Vapor Emissions Remediation (MVER) system following shot blasting and application.

#### B. Pre-installation Meetings

1. Arrange, in accordance with Section 013119.
2. Attendance: Contractor, installer, owner, architect, manufacturer's representative, and those requested to attend.
3. Meeting Time: Minimum 4 weeks prior to beginning work of this Section and work of related Sections affecting work of this Section, including prior to installation of finish flooring systems.
4. Location: Project Site.



5. Agenda: Confirm system and procedures suitable to mitigate moisture emissions and achieve intended expectations. Confirm tests required, compatibility of materials, protection of adjacent construction, and other procedures required for remediation.

C. Sequencing and Scheduling: Conform to Section 013216

1. Schedule and sequence work of this Section to achieve suitable concrete substrate for installation of finish flooring systems within Construction Progress Schedule Critical Path.
2. Schedule project to enclose building envelope minimum 60 days prior to installation of finish flooring systems. Where this is not practical or moisture vapor emissions, pH level, and relative humidity are above acceptable levels, conform to provisions of this Section in time to meet project construction schedule.

### 1.05 Action submittals

- A. Submit under provisions of Section 013300.
- B. Product Data Sheets (PDS): Product description, properties, characteristics, and other technical data for products use in remediation system.
- C. Samples: Actual cured system showing thickness, color, and visual characteristics.

### 1.06 Informational submittals

- A. Submit under provisions of Section 013300.
- B. Safety Data Sheets (SDS).
- C. Sample Warranty: Meet or exceed provisions specified by this Section.
- D. Manufacturer's Instructions: Include installation instructions, special procedures, and conditions requiring special attention.
- E. Manufacturer's Field Reports: Include project, date, environmental conditions, moisture and alkalinity levels, recommendations, and results as applicable and field report indicating acceptance on-site conditions for specified system by manufacturer's representative.

### 1.07 Sustainable Design Submittals

- A. Submit under provisions of Section 033300.
- B. Sustainable Design Certifications: Signed by manufacturer authorized representative, as applicable, for documentation of products contributing toward LEED Credits in conformance to Section 018113.
- C. Indoor Environmental Quality (IEQ): IEQ Credit 4.3: Low-emitting materials for concrete floor slabs.
- D. Sustainable Products Cost Data: Submit cost for certified sustainable product submittal. Exclude cost of labor and equipment to install products.



## 1.08 Quality Assurance

### A. Manufacturer Qualifications:

1. Able to document minimum 5 year experience manufacturing and supplying Moisture Vapor Emission Reduction (MVER) systems conforming to criteria specified by this Section.
2. Able to document minimum 5 successful remediation projects where test data required remediation in order to meet adhesion and warranty provisions for finish flooring.
3. Maintain locally available testing, inspection, and technical representatives as required to determine procedures and confirm results.

### B. Installer Qualifications:

1. Able to document not less than 5 year experienced in surface preparation and application of fluid-applied coating systems over concrete slabs.
2. Accepted by manufacturer as qualified to perform work of this Section.

### C. Pre-application Testing:

1. Conduct testing by Owner's Independent Testing Agency of moisture vapor emission reduction system, conforming to provisions of Section 033000 and following:
  - a. Subfloor moisture content measured with a Tramex moisture meter – Primary Method
  - b. Alkalinity of Concrete Substrate: Test to ASTM F710.
  - c. In Situ Relative Humidity of Slab: Test to ASTM F2170
  - d. Moisture Emission Test to ASTM F1869 accepted only when used secondarily to in situ relative humidity test method and Tramex moisture meter.
2. Use results of test data to verify criteria for system required for remediation work and as needed to meet requirements of Section 03300 and warranty provisions of finish flooring systems. Verify manufacturer's specific product system and make adjustments to that system as recommended by manufacturer.
3. Prepare pre-installation checklist of procedures necessary for testing, preparation, and protection of prepared concrete substrates necessary to meet remediation system manufacturer's warranty provisions.

### D. Field Samples: Provide under Quality Assurance provisions of Section 014300.

1. Apply Moisture Vapor Emission Remediation (MVER) system over a minimum 6 by 6 foot square foot area at location as directed by Architect.
2. Provide additional site samples as required for acceptance and as required to show conformance to manufacturer's instructions and provisions of Contract Documents.
3. Make tests for vapor emissions and alkalinity levels as necessary to confirm results.
4. Do not begin work of this Section until after testing and inspection by manufacturer's representative is complete and system is acceptance by Architect.
5. Protect and maintain accepted site sample as standard of quality for work of this Section.
6. Incorporate accepted site sample into work.



### 1.09 Delivery, storage, and handling

- A. Conform to provisions of Section 016510 and manufacturer's instructions.
- B. Product Delivery: Deliver in manufacturer's unopened protective packaging with manufacturer's identifying labels intact.
- C. Store products in ventilated area, protected from dampness, freezing, direct sunlight, breakage, and damage from construction activities.
- D. Store in area with ambient temperatures maintained between 50°F and 77°F.

### 1.10 Field conditions

- A. Conform to following and other precautions as instructed by manufacturer.
- B. Ambient Surface Conditions of Concrete:
  - 1. Surfaces temperatures at least 5°F above dew point.
  - 2. Surfaces dry and free of dampness and standing water.
  - 3. Surfaces ambient temperature not below or expected to fall below 50°F within a 24 hours period.
- C. Ventilation: Maintain application area well ventilated with free and continuous air movement during application and curing period.

### 1.11 Warranty

- A. Conform to Warranty provisions specified Section 017836.

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***Specify 10-year labor and materials warranty for Sika® using manufacturer approved installer.***

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- B. Manufacturer: Standard 10 year labor and materials Warranty against unacceptable levels of concrete internal relative humidity and surface moisture content.



## PART 2: PRODUCTS

### 2.01 System

- A. Moisture Vapor Remediation System: Epoxy resin based coating formulated to overcome and control unacceptable vapor emission levels and alkaline pH levels in concrete slabs to acceptable levels.
- B. This Section does not apply where testing shows that Moisture Vapor Emissions Rates (MVER), relative humidity, surface moisture and alkalinity levels at concrete slabs are at acceptable levels.
- C. This Section applies where testing of concrete slabs shows over 3 pound Moisture Vapor Emission Rates (MVER) as tested to ASTM F1869, between 4-6% moisture when measure using a Tramex moisture meter or internal relative humidity exceeding 75% as tested to ASTM F2170, except as otherwise accepted by manufacturer instructions and Architect.
  - 1. Bring concrete slab systems into conformance to specified criteria specified by Section 033000 and manufacturer warranty provisions for resilient flooring systems.
  - 2. Meet published requirements and to meet warranty criteria for acceptable moisture vapor transmission and alkalinity levels.

### 2.02 Manufacturers

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***Sika® Secure System requires a monolithic layer of Sika® MB Redline followed by either a sand broadcast to refusal or Sika® Level-02 EZ Primer. Moisture vapor permeance of Sika® MB Redline is 0.06. Dry time is as little as 3 hrs. depending on application and environmental conditions.***

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- A. Sika® Secure System
  - 1. Cell 732.207.1609, Email: [croes.mike@us.sika.com](mailto:croes.mike@us.sika.com) (Mike Croes, District Sales Manager)
  - 2. Cell 206.930.2128, Email: [prewitt.joshua@outlook.com](mailto:prewitt.joshua@outlook.com) (Joshua Prewitt, Sales Rep)
  - 3. Website: [usa.sika.com](http://usa.sika.com)
- B. Substitution Requests: Conform to provisions of Section 012500.

### 2.03 Performance / Design Criteria

Conform to ASTM F3010 for general properties, preparation, application, and performance of two-component resin based membrane-forming moisture mitigation systems specified by this Section except where more stringent requirements are specified by this Section.



## 2.04 Materials

Properties of the cured epoxy Resin System: Alkali resistant, low viscosity epoxy coating.

1. Vapor Reduction Compared to Untreated Concrete	ASTM F1869	25 lbs/1000sq.ft./24hrs per CC
	ASTM F2170	100% per R.H.
2. Permeability	ASTM E96	< 0.06 perms
3. Insensitivity of System to Alkalinity Environment	ASTM D1308	Up to pH 14
4. Pull-Off Strength (Adhesion)	ASTM D4541	Min. 200 psi
5. Volatile Organic Content (VOC)		< 68 g/l
6. Solids Content		Min. 97%

**Note: Tests above were performed with the material and curing conditions @ 71°F – 75°F and 45 - 55% relative humidity.**

## 2.05 Accessories

- A. Bonding Emulsion: Conform to manufacturer's instructions.
- B. Self-Leveling Overlay: Conform to manufacturer's instructions, and provisions of Section 035410.
- C. Primer: Non-porous, and as instructed by manufacturer.
- D. Other (As Applicable): Including sand in lieu of primer and for broadcasting, as instructed by manufacturer.

## 2.06 Equipment

- A. Shot Blasting Equipment: Equipped with vacuum to capture and prevent concrete dust from escaping into interior spaces, and as instructed by manufacturer.
- B. Grinding Equipment: Equipped with vacuum to capture and prevent concrete dust from escaping into interior spaces, and as instructed by manufacturer.



## PART 3 EXECUTION

### 3.01 Examination

- A. Verify conditions ready to receive work of this Section before beginning.
- B. Inspect and verify concrete slab surfaces:
  - 1. Structurally sound, solid, and suitable for remediation work of this Section.
  - 2. Surface dry to touch and absorbent.
  - 3. Clean and free of oil, wax, grease, asphalt, paint, latex, and gypsum compounds, curing compounds, dust, and other contaminants that may inhibit penetration and or act as a bond breaker.
- C. Tensile Strength of Concrete Slab: Minimum 200 psi, tested to ASTM D7234. Test to failure of concrete surface.

### 3.02 Preparation

- A. Mechanically profile concrete substrate using dustless methods, conforming to ICRI Guideline No. 310.2-1997 (formerly No. 03732, CSP 3) - Light Shotblast (preferred) or grind or CSP 4 - Light Scarification and CPS 5 - Medium Shotblast, to achieve to profile as instructed by manufacturer.
- B. Remove curing compounds, sealers, densifiers, waxes, dust-proofing, oils, asphalt, dust, debris, adhesives, pre-existing patching materials, leveling compounds, paint, dirt, oils, grease, curing agents, efflorescence, laitance, shot blast beads and other contaminates as necessary to put slab in absorptive condition and promote adhesive bond of remediation system.
- C. Do not acid etch.
- D. Repair cracks, open joints, honeycombs, and other surface defects, in conformance to manufacturer's instructions.
- E. Burn off exposed fiber-reinforcing. Scrape clean and vacuum.

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***Install hydraulic cement underlayment over moisture vapor emissions remediation system, except for incompatibility issues such as where adhesion to MVER system is questionable.***

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- F. Apply cementitious underlayment under work of Section 035416 at slabs out of tolerance, conforming to floor flatness and floor levelness tolerances specified by of Section 033000.
  - 1. Verify compatibility with moisture-vapor emission remediation (MVER) system specified by this Section.
  - 2. Apply non-porous primer prior to application of cementitious underlayment where primer is required by manufacturer's instructions or include sand broadcast with MVER system.
  - 3. Underlayments containing gypsum are not accepted.





### 3.03 Application

- A. Conform to manufacturer's instructions and provisions of Contract Documents.
- B. Apply to concrete following a minimum 7 day curing period or when surface moisture is <6% when measured with a Tramex moisture meter.
- C. Apply using roller and squeegee.
- D. Provide coating coverage, and curing periods between multiple coatings as required for remediation of unacceptable moisture vapor emissions and alkalinity levels.
  - 1. Pour resin out of mixing vessel in a ribbon pattern to avoid early curing.
  - 2. Spread evenly using paint roller.
  - 3. Apply first and second coats at cross directions to each other.
  - 4. Finish smooth and homogeneous with no pinholes.

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***Back rolling is required for one-coat systems to spread coating evenly. Two-coat systems may not require this.***

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- E. Back broom or back roll application as necessary to achieve even coverage, leaving no areas untreated. Avoid ponding and creating pin holes.
- F. Where sand broadcasting is included in manufacturer's system, broadcast sand, conforming to manufacturer's instructions.
  - 1. Broadcast sand immediately over second coat to point of refusal.
  - 2. After a minimum of 3 hours, broom sweep and vacuum surface to remove loose sand. Do not use sweeping compounds.

### 3.04 Field Quality Control

- A. Manufacturer's Representative: Make initial, intermittent, and final inspections to verify conditions acceptable for application and that application is performed in conformance to manufacturer's instructions.
- B. Field Testing: Conduct field tests as specified and accepted for pre-application tests and verify in situ relative humidity testing and pH results as acceptable to meet warranty provisions of resilient finish flooring manufacturers.

### 3.05 Adjusting

- A. Inspect and make adjustments after installation.
- B. Reapply or take other actions as necessary to remediate defective or unsuccessful application.

### 3.06 Cleaning

Leave installations clean and premises free from residue and debris from work of this Section.



### **3.07 Protection**

- A. Protect Moisture Vapor Emissions Reduction (MVER) system from topical water and other prolonged water contact for a period of 24 hours following application.
- B. Cover surfaces at construction traffic areas with plywood or OSB panels until installation of underlayment or topping is complete.

### **Concrete Restoration Systems by Sika Corporation, 201 Polito Avenue, Lyndhurst, NJ 07071**

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