

## Surface Preparation for Concrete Substrates

### I. GENERAL INFORMATION

Surface preparation is considered to be the most important step of any resinous flooring application. Improper surface preparation could turn a simple and easy application into a lengthy and difficult repair. The following conditions will dictate the type of surface preparation:

#### A. Concrete Placement

1. Slab-on grade or on the ground
  - a. A 10mil minimum vapor barrier is necessary to prevent moisture vapor transmission. An efficient puncture proof barrier is recommended.
  - b. Proper jointing will minimize cracking which could transmit through the resinous flooring system.
2. Elevated slabs
  - a. Pan construction should be vented.
  - b. Metal deck construction should be properly jointed to minimize cracking.

#### B. Curing and Finishing Techniques

1. Curing compounds must be mechanically removed from the concrete surface prior to all resinous flooring applications
2. Recommended techniques
  - a. Wet cure
  - b. Light steel trowel finish to minimize laitance and provide hard surface

#### C. Age of Concrete

Concrete must be a minimum of 30 days old for resinous flooring applications. Primers are now available that can be used on freshly poured concrete on some installations. Contact the technical department for details

#### D. Previous Contamination

It can affect the bond of the resinous flooring and must be removed. Types of contamination are:

1. Oil, grease, or food fats can usually be burned off with a flame gun or removed with a commercial degreasing compound or solvent.

2. Curing compounds, sealers, and other laitance are best removed mechanically with:

- a. vacuum shot blasting
- b. scarifying
- c. sand blasting

#### E. Present Condition

1. Test for moisture: coating system bond failures on slabs on grade and elevated/lightweight concrete caused by moisture vapor transmission are the industry's largest single problem and result in extreme frustration from owners, clients, and contractors. **Duraamen** recommends testing for moisture vapor transmission. The recognized methods are:

- a. **ASTM-F-1869** – *Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Sub floor using Anhydrous Calcium Chloride*: The maximum allowed water/vapor transmission rate is 3 pounds per 1,000 ft<sup>2</sup> per 24 hours.
- b. **ASTM F-2170** – *Standard test method for Determining Relative humidity in Concrete Floor Slabs using in-situ Probes*: This test measures the relative humidity in the slab below the surface. If taken over a period of time, it will show the rate of drying in the slab. The maximum relative humidity should be below 80%.
- c. **ASTM D-4263** – *Plastic Sheet Test*: This test only gives an indication that moisture may be present and should never be used as a basis for decision.

2. Moisture related failures can be prevented through:

- a. Placing new concrete over an efficient vapor barrier.

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- b. Testing for moisture vapor transmission as prescribed above prior to resinous flooring application.
  - c. Applying a moisture vapor transmission reduction system where moisture content is too high for successful resinous flooring applications.
3. A clean surface is necessary to establish a strong bond between the resinous flooring and concrete
  4. Resinous flooring systems are only as sound as the concrete they are applied to. All unsound concrete should be repaired or replaced prior to resinous flooring applications.
  5. Resinous flooring materials should be applied to level concrete substrates. Grind or fill high and low spots prior to application.
  6. Repair cracks prior to resinous flooring applications.

#### *F. Mechanical Prep Vs Acid Etching*

Resinous flooring materials ideally bond to concrete with a rough, sand-paper finish. This finish can be achieved by either acid etching or mechanical methods. The choice of preparation is dictated by the above factors. Other factors that determine the type of preparation include:

1. Ecological restrictions involved with waste removal which could prohibit the use of acid etching and other chemical methods.
2. The type of resinous flooring material: It is recommended that concrete floors be acid etched prior to application of polyester and vinyl ester flooring systems.

#### *G. Acid Etching*

The following steps are recommended for acid etching:

1. Dilute commercial muriatic acid with water @ 1 part acid to 3 parts water by volume. Add the acid slowly taking

care to avoid splashing. Workers should be protected with safety glasses, rubber gloves, and boots. If skin or eye contact occurs, rinse affected area thoroughly with clean water and follow Material Safety Data recommendations.

2. Sprinkle acid solution onto the entire surface in order to allow the acid to reach all areas of the concrete. Adequate coverage is approximately 75ft<sup>2</sup>/ga of acid/water solution. Do not puddle and spread.
3. Scrub the acid solution into the concrete using a stiff bristle broom to remove loose concrete and laitance.
4. Before rinsing, look for areas where bubbling did not occur. These areas have not been sufficiently cleaned and will require mechanical scarifying and additional acid etching.
5. When the acid solution has stopped bubbling (usually after approximately 15 minutes), rinse the floor thoroughly with water. Do not allow the floor to dry before rinsing because the salts formed by the acid reaction may cause problems with the adhesion and performance of the resinous flooring system. Test pH of the concrete surface to verify that the concrete tests alkaline.
6. Finally, the floor should be dry mopped to remove standing water and dirt remaining after the acid etching. Allow the floor to completely dry to prior to the application of any resinous flooring system. Failures can occur in resinous flooring system applications due to moisture remaining in the substrate.

#### *H. Mechanical Preparation*

Contamination and other foreign materials must be mechanically removed to ensure a satisfactory bond. All dust and debris must be thoroughly removed. Vacuum shot blasting is an effective, dust-free method of preparing existing concrete.

## II. OLD CONCRETE

Old concrete surfaces must be structurally sound. Any unsound area must be repaired prior to proceeding with the resinous installation. For proper patching and repairing, consult Duraamen representative. Remove existing paint, scale and loose concrete by rough sanding, sandblasting, shot blasting, or grinding. In some cases where plant conditions allow, a stripper may be used to remove excessive build-up of paints or sealers.

Structurally sound concrete should be mechanically prepared to remove any contamination. Vacuum shot blasting is the best method for achieving a good profile for bonding and should be used where possible. Before installation of any Duraamen products, the surface must be examined for moisture vapor transmission using:

**ASTM-F-1869** - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

**ASTM-F-2170** - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs using In-Situ Probes

**ASTM-D-4263** - Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method. This test is only an indication and should not be used to determine moisture migration.

Other ASTM Tests which are applicable to concrete preparation are:

**ASTM-D-4258** - Standard Practice for Surface Cleaning Concrete for coating

**ASTM-D-4259** - Standard Practice for Abrading Concrete

**ASTM-D-4260** - Standard Practice for Acid Etching Concrete

**ASTM-D-4261** - Standard Practice for Surface Cleaning Concrete Unit Masonry for Coating

**ASTM-D-4262** - Standard Test Method for Ph of Chemically Cleaned or Etched Concrete Surfaces

**ASTM-C-811** - Standard Practice for Surface Preparation of Concrete for Application of Chemical Resistant Resin Monolithic Surfacing

## III. NEW CONCRETE

New concrete must be well cured and dry prior to coating. Allow to cure a minimum of 28 days unless using green concrete pimper. No curing agents or sealing compounds should be used at any time prior to coating. A light steel trowel finish is recommended when finishing the concrete surface.

Any oil, grease, laitance, or other foreign material must be removed. Steam clean with a strong degreaser such as tri-sodium phosphate. Laitance and other foreign material are best removed by mechanical methods such as vacuum blasting, scarification, or grinding. All new concrete can be acid etched or mechanically prepared by vacuum shot blasting, sand blasting, scarifying, or grinding. Vacuum shot blasting provides the cleanest environmentally safe area during cleaning. It also provides a mechanically rough surface to achieve a good bond. When acid etching use a 3 to 1 dilution of water to acid and follow printed above.

Before the installation of a resinous system, the surface should be examined for moisture. Test for moisture. Test for moisture vapor transmission using ASTM F-1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Sub-floor Using Anhydrous Calcium Chloride. The maximum allowable rate is 3 pounds per 1,000 square feet per 24 hours. Another procedure that helps determine slab dryness is ASTM-F-2170- Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In-Situ Probes. Maximum allowable R.H. for porometer test is 80%.