



Technical Bulletin #1

Surface Preparation for Concrete and Wood Substrates

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 what seems to be a simple process into a lengthy, 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 10 mil 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, if used, 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 which can be used on fresh (green) concrete on some installations. Contact the technical department for details.

D. Previous Contamination 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 shotblasting
 - 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. **KEY RESIN COMPANY** 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 Subfloor Using Anhydrous Calcium Chloride:** The maximum allowed water/vapor transmission rate is 3 pounds per 1,000 square feet 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 of decision.
2. **Moisture related failures can be prevented through:**
 - a. Placing new concrete over an efficient vapor barrier.
 - 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. Consult your KEY REPRESENTATIVE for specific information.**
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 factors above. Other factors which 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 using 1 part acid by volume to 3 parts clean 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 75 ft²/gallon 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 laitancy.**
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 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 shotblasting is an effective, dust-free method of preparing existing concrete.

II. OLD CONCRETE

Old concrete surfaces must be structurally sound. Any unsound areas must be repaired prior to proceeding with the resinous installation. For proper patching and repairing, use **Key Resin 502** with graded aggregate or consult your **Key Technical 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 **Key Resin System**, 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 primer. 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 shotblasting, sand blasting, scarifying, or grinding. Vacuum shotblasting 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 directions printed above.

Before the installation of any Key resinous system, the surface should be examined for moisture. Test for moisture vapor transmission using ASTM F-1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor 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 protimeter test is 80%.

WOOD SUBSTRATES

I. GENERAL INFORMATION

Resinous flooring must always be applied directly to **exterior grade plywood with extended glue line**. **INTERIOR GRADE PLYWOOD** delaminates easily and **SHOULD NOT BE USED** as it could result in a failure of the resinous flooring system. **MARINE GRADE PLYWOOD** contains moisture repellants which could cause a darkening of the resinous flooring system and **SHOULD NOT BE USED**. All plywood must be completely free of all waxes, varnishes, or other foreign materials.

A. Plywood used to cover existing wood floors

1. **Clean and fasten existing wood floor to the floor joists.**
2. If the floor is completely sound, fasten ½ **Exterior grade plywood "C" plugged with an extended glue line** to the existing floor. Stagger the plywood for strength.
3. ¾" **DFPA Exterior or ¾" DFPA Underlayment grade plywood with exterior glue line** must be used if the existing floor cannot be cleaned, or is not sound.
4. All plywood must be completely free of all waxes, varnishes, or other foreign materials.
5. Secure plywood with exterior glue.
6. Use **Ring Shank** or **Coated Nails** at six (6) inch centers around panel edges and support.
7. Stagger all panel joints, fill joints with epoxy filler, and cover joints with fiberglass cloth and epoxy resin.
8. Lightly sand the floor surface to insure proper adhesion of the resinous flooring system.
9. Prime surface with appropriate primer prior to system application. Surface may require double priming due to porosity of plywood.

B. Plywood used for new construction (plywood is laid directly on the joist)

1. ¾" **exterior grade plywood "C" plugged with an extended glue line** must be used.
All plywood must be completely free of all waxes, varnishes, or other foreign materials.
2. Use **Ring Shank** or **Coated Nails** at six (6) inch centers around panel edges and support.
3. Stagger all panel joints, fill joints with epoxy filler, and cover joints with fiberglass cloth and epoxy resin.

4. Lightly sand the floor surface to insure proper adhesion of the resinous flooring system.
5. Remove all dust with a vacuum cleaner.

C. Applications with waterproofing:

1. After preparing the floor surface as prescribed above, caulk all joints with a sealant.
2. Coat joints with 30 mils of the elastomeric coating.
3. Apply the waterproofing membrane as specified.

METAL SUBSTRATES

I. Preliminary Preparation

- A. Metal substrates must be structurally sound prior to any resinous system being applied.
- B. Remove all foreign materials such as oil and grease with solvents or other degreasing compounds.
- C. All scaling and rust must also be removed mechanically by sanding, sandblasting, or abrasion.

II. Treat the blasted/abraded surface with a phosphoric acid solution as described below in order to prevent rust formation if the surface is left exposed for some time prior to application of the resin system.

- A. Always use a 10% solution of Phosphoric Acid.
- B. Mix acid solution in either glass, plastic, or earthen containers (never use metal containers), by adding Phosphoric Acid to water. NEVER VICE-VERSA due to heating or splashing which may occur.

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.
- C. Apply phosphoric acid solution by either paint brush or rubber squeegee and allow metal surface to **AIR DRY**.

DO NOT FLUSH METAL SURFACE WITH WATER.

III. Protect surface from contamination until the primer is applied.

IV. Wipe metal surface with MEK solvent immediately before primer application.

For more in-depth information concerning the preparation of metal surfaces, please refer to the **TECHNICAL BULLETIN** discussing the preparation of steel or metal surfaces or contact your **KEY REPRESENTATIVE** at **(888)943-4532**.