



GUIDELINE INSTRUCTIONS FOR CONCRETE SURFACE PREPARATION (FORM G-1, REVISED 09/05)

INTRODUCTION

The following concrete surface preparation guidelines, serves as an aide to owners, design professionals, specifiers and contractors. All surfaces to receive General Polymers sealers, coatings, mortars and resurfacers, must be structurally sound, clean and at minimum, saturated surface dry (SSD). Proper surface preparation is an extremely important factor in the immediate and long-term successful performance of applied polymer floor or wall systems.

The contractor responsible for the installation of the polymer system shall be provided a substrate that is clean, durable, flat, pitched to specifications, SSD and free of surface contaminants. Providing the "proper substrate" is the responsibility of the owner, the owner's appointed representative and the concrete contractor, unless specifically stated otherwise. Guide Specification for "Cast in Place Concrete for Floor Slabs on Ground That Will Receive Semi-Permeable or Impermeable Floor Finishes", should be referred to for installation of fresh concrete. Regardless of responsibility, the steps listed below must be accomplished prior to the placement of a bonded polymer system on concrete.

PROPER SURFACE PREPARATION

Proper surface preparation includes the following:

1. Inspection of the concrete substrate
2. Removal and replacement of non-durable concrete
3. Decontamination of the concrete surface
4. Creation of surface profile
5. Repair of surface irregularities

1. Inspection of the concrete substrate to determine its general condition, soundness, presence of contaminants, presence of moisture vapor emissions and the best methods to use in preparation of the surface to meet the requirements of the owner or the owner's appointed representative is critical. A proper evaluation will lead to the selection of the proper tools and equipment to accomplish the objective.

2. Removal and replacement of non-durable concrete must be accomplished prior to installation of the polymer system. Localized weak or deteriorated concrete must be removed to sound concrete and replaced with cementitious or polymer concrete repair mortars, or an engineered concrete mix design utilizing 4700 series polyacrylate polymer additive. For application of these systems and compatibility with the selected polymer sealer, coating, lining or topping refer to the System Bulletins, Technical Data Sheets or the Technical Services Department. Occasionally, plain fresh concrete is required and must be bonded to existing concrete. When bonding fresh concrete to existing, prepare the existing concrete surface by scabbling, scarifying, abrasive (sand) blasting, needle scaling, high pressure water jetting (5,000 to 45,000 psi), or steel shotblasting. Apply a low modulus epoxy as the bonding agent at a rate of 80 square feet per gallon for a WFT of 20 mils, and then place the fresh concrete or mortar. Bonding to lightweight concrete may require a second coat of epoxy if the first coat is readily absorbed into the concrete surface. Always place the fresh concrete within the open time of the epoxy, while the epoxy-bonding agent is still wet. Rough concrete surfaces will require additional material depending on the surface profile. Fresh concrete should have a low water cement ratio (w/c) not to exceed 0.40. When bonding fresh concrete containing latex polymer admixtures, check compatibility of the latex modified concrete mixture by either installing a test patch and performing a pull-off test, or by conducting a slant shear test in accordance with ASTM C 882, in an independent concrete testing laboratory.

3. Decontamination of the concrete surface requires the removal of oils, grease, wax, fatty acids and other contaminants, and may be accomplished by the use of detergent scrubbing with a heavy duty cleaner/degreaser, low pressure water cleaning (less than 5,000 psi), steam cleaning, or chemical cleaning. The success of these methods is dependent upon the depth of penetration of the contaminant; which is completely dependent upon the contaminant's viscosity, the concrete's permeability and the duration of exposure. Special care should be taken when preparing concrete at an "in use" facility for repair, replacement or an initial floor topping. This is especially true for Food Processing facilities. Contaminants can be carried into exposed concrete as most of these facilities use copious amounts of water. The contaminants can be animal fats/oils, blood, cleaning solutions, microbes, etc. They may not be completely removed during preparation (shot blasting). The concrete may appear clean and well profiled.

A simple method to ensure you have sound concrete is to test the pH. The chemistry of concrete is alkaline in nature. Normal concrete should be in the range of 11 to 13. Most of the contaminants mentioned are neutral to acidic in nature. After preparation test the floor in multiple locations using distilled water and the pH paper. If the pH is 10 or lower additional preparation will be required to ensure a good bond. In areas where the contaminants can not be removed, the contaminated concrete must be removed and replaced as in 2., above.

CAUTION: Decontamination methods that introduce large amounts of water may contribute to moisture related problems as referenced in APPENDIX A.

4. Creation of surface profile can be accomplished by a number of methods each utilizing a selection of tools, equipment and materials to accomplish the intended purpose, (See METHODS OF SURFACE PREPARATION below). Selection is dependent upon the type of surface to be prepared and the type of system to be installed. In addition, floors, walls, ceilings, trenches, tanks and sumps each have their own particular requirements. The type and thickness of the selected polymer system also plays an important role in the selection process. Regardless of the method selected or tools employed, we must provide a surface that will accept the application of polymer-based products and allow the mechanical bond of the polymer securely to the concrete. The type of service the structure will be subjected to, will also help to define the degree of profile required. The surface profile is the measure of the average distance from the peaks of the surface to the valleys as seen through a cross sectional view of the surface of the concrete.

This dimension is defined pictorially and through physical samples in the ICRI Technical Guideline No 03732, and is expressed as a Concrete Surface Profile number (CSP 1-9).

- For General Polymers coating and sealing applications from 4 to 15 mils in thickness, the surface profile shall be CSP 1, 2, or 3, typically accomplished through decontamination of the concrete surface as defined in 3. above, followed by acid etching, grinding, or light shotblast.
 - For General Polymers EPO-FLEX® and other coating applications from 15 to 40 mils in thickness, the surface profile shall be CSP 3, 4, or 5, typically accomplished through decontamination of the concrete surface as defined in 3. above, followed by light shotblast, light scarification or medium shotblast.
 - For General Polymers CERAMIC CARPET™, TRAFFICOTE™, AquArmor™ S, **FasTop™** MVT and other topping applications from 40 mils to 1/8", the surface profile shall be CSP 4, 5, or 6. These are typically accomplished through decontamination of the concrete as defined in #3 above, followed by light scarification, medium shotblast or medium scarification.
 - General Polymers Terrazzo, CERAM, CERAMIC CARPET, TRAFFICOTE, TPM, AquArmor M, **FasTop** Slurry and Mortar systems and other topping Applications greater than 1/8", the surface profile shall be CSP 5, 6, 7, 8, or 9. These are typically accomplished through decontamination of the concrete as defined in 3 above, followed by medium shotblast, medium scarification, heavy abrasive blast, scabbled, or heavy scarification.
- 5. Repair of surface irregularities** including bugholes, spalls, cracks, deteriorated joints, slopes, areas near transition zones, such as around drains and doorways, etc. must be repaired prior to the placement of the polymer system and/or the system must be designed to off-set the thickness of the irregularities. For removal and replacement information and materials, refer to item 2., above. For bugholes and other minor surface irregularities, fill with Epoxy Quick Patch (3500), 4700 Instant patch Resin or the system resin mixed with a vertical grade aggregate. For treatment of cracks and joints refer to the section below entitled "Crack Isolation and Waterproofing Membranes". For additional questions, contact the Technical Service Department or, your local sales representative for specific recommendations.

For specific applications, always consult General Polymers System Bulletins, Technical Data Sheets or Technical Services Department.

METHODS OF SURFACE PREPARATION

Depending upon conditions of the concrete one or more methods of surface preparation may be required. It is common for decontamination to precede mechanical preparation, and if necessary a second decontamination to follow.

The preferred methods for creation of a surface profile, including the removal of dirt, dust, laitance and curing compounds, is steel shotblasting, abrasive (sand) blasting or scarifying. The steel shotblasting or vacuum blasting process is commonly referenced by equipment brand names, such as, Blastrac, Vacu-Blast, Shot-Blast, etc. Vertical and overhead surfaces, such as cove base, wall, and ceiling surfaces shall be prepared utilizing methods of grinding, scarifying, abrasive (sand) blasting, needle scaling, high pressure water jetting (5,000 to 45,000 psi), or vertical steel shotblasting. CAUTION: The use of high pressure water jetting will introduce large amounts of water, which may contribute to moisture related problems as referenced in APPENDIX A. The following table provides a guide for the degree of surface profile required for the coating or overlay to be applied and the preparation methods used to generate each profile.

Application	Profile	Surface Preparation Method
Sealers	0-3 mils	Detergent scrub Low-pressure Water Acid Etching (not recommended) Grinding
Thin Film	4-10 mils	Acid Etching (not recommended) Grinding Abrasive Blast Steel Shot Blast
High-Build	10-40 mils	Abrasive Blast Steel Shot Blast Scarifying
Self-Leveling	50mils-1/8 inch	Abrasive Blast Steel Shot Blast Scarifying Needle Scaling High/Ultra high Pressure Water Jetting
Polymer Overlay	1/8-1/4 inch	Abrasive Blast Steel Shot Blast Scarifying Needle Scaling High/Ultra high Pressure Water Jetting Scabbling Flame Blasting Milling/rotomilling

Surfaces to receive the bonded polymer system must be inspected after the surface is prepared to insure that the substrate is sound and structurally durable. Areas found to be unsound or non-durable must be removed and replaced as described in 2., above. Dust or other deleterious substances not removed after the initial surface preparation must be vacuumed, leaving the surface dust free and clean.

Other surface preparation methods are mentioned in ADDITIONAL SURFACE PREPARATION REFERENCES below.

CRACK ISOLATION and WATERPROOFING MEMBRANES

The performance of elastomeric membranes such as EPO-FLEX® internally flexible epoxy, requires a relatively uniform dry film thickness to resist drying shrinkage and thermal movement of the concrete, while maintaining a seamless bridge or seal over the concrete. Therefore it is critical that all mortar splatter, protrusions, ridges, penetrations, or sharp projections in the surface of the concrete, be ground smooth or otherwise made smooth, in addition to the normal surface preparation outlined above.

Prior to application of an elastomeric membrane system, control/contraction joints, construction joints, and cracks should be sealed with the selected system flexible sealant, i.e., EPO-FLEX flexible sealant, and coated with 20 mils of the selected compatible elastomeric membrane. This coating should extend a minimum of 6” on either side of the joint or crack. The entire surface area should then receive the specified crack isolation or waterproofing system. Isolation and/or expansion joints should be detailed in accordance with the plans and specifications of an architectural or engineering design professional for the type of structure being considered. Consult the Technical Services Department for the proper selection and use of Isolation and/or Waterproofing membranes and the potential use of fiberglass scrim cloth for additional crack bridging capabilities.

NOTE: General Polymers systems can be applied to a variety of substrates if the substrate is properly prepared. Preparation of surfaces other than concrete or steel, such as wood, concrete block, brick, quarry tile, glazed tile, cement terrazzo, vinyl composition tile, plastics and existing polymer systems, can be accomplished to receive bonded polymer sealers, coatings, or toppings. For questions regarding a substrate other than concrete or steel, or a condition not mentioned in this guideline, contact the Technical Service Department prior to starting the project. For steel surfaces, refer to Guideline Instructions for Surface Preparation of Structural Steel, Form G-2.

ADDITIONAL SURFACE PREPARATION REFERENCES

Important and relevant information on surface preparation of concrete is available by referencing the following codes, standards, and guidelines.

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| SSPC | The Society for Protective Coatings, 40 24 th Street, 6 th Floor, Pittsburgh, Pa. 15222-4643, (412) 281-2331. <ul style="list-style-type: none">• SSPC-SP 13 Surface Preparation of Concrete• SSPC-TU 2/NACE 6G197 Design, Installation, and Maintenance of Coating Systems for Concrete Used in Secondary Containment |
| ICRI | International Concrete Repair Institute, 1323 Shepard Dr., Suite D, Sterling, VA 20164-4428, (703) 450-0116 <ul style="list-style-type: none">• Technical Guideline No.03732, “Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays”. Includes visual standards to act as a guide in defining acceptable surface profiles for the application of industrial coatings and polymer floor toppings.• Technical Guideline No.03730, “Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion”. |
| ASTM | American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, (610) 832-9585 <ul style="list-style-type: none">• ASTM D 4258 “Practice for Surface Cleaning Concrete for Coating”• ASTM D 4260 “Standard Practice for Acid Etching Concrete”• ASTM D 4261 “Practice for Surface Cleaning Unit Masonry for Coating”• ASTM D 4262 “Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces” |