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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Practice for Surface Preparation of Concrete for Application of Chemical-Resistant Resin Monolithic Surfacings[1]

This standard is issued under the fixed designation C 811; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This practice provides for the preparation of concrete to receive resinous monolithic surfacings. In these recommendations, the term *monolithic surfacings* includes toppings applied 60 mils (1.5 mm) in thickness or greater over concrete, which cure in place, are continuously bonded to the concrete surface, and provide a continuous surfacing.

1.2 The surfacings consist of fillers, resins, and hardeners which when properly mixed, applied and cured, bond to primed or unprimed concrete. The monolithic surfacings may be either reinforced or unreinforced.

1.3 This practice does not restrict the method of application.

1.4 This practice is intended for use with filled resin systems such as those covered by Specification C 722 and is not intended to supersede specific manufacturer's instructions.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

C 722 Specification for Chemical-Resistant Resin Monolithic Surfacings[2]

C 904 Terminology Relating to Chemical-Resistant Nonmetallic Materials[2]

D 4258 Practice for Surface Cleaning Concrete for Coating[3]

D 4259 Practice for Abrading Concrete[3]

D 4260 Practice for Acid Etching Concrete[3]

D 4262 Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces[3]

D 4263 Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method[3]

D 4285 Test Method for Indicating Oil or Water in Compressed Air[3]

2.2 *Other Standards:*

ACI 308 Recommended Practice for Curing Concrete[4]

ACI 503R-89 Use of Epoxy Compounds with Concrete[4]

3. Terminology

3.1 *Definitions*—For definitions of terms used in this practice, see Terminology C 904.

4. Concrete Requirement

4.1 The concrete should be designed to withstand all structural, thermal, mechanical stresses, and loading which will occur during service. It must remain stable while protected by the monolithic surfacing and be provided with all necessary expansion, construction, control, and isolation joints to allow it to perform. Failure of the substrate to remain stable will invariably affect the performance of the surfacing. In particular, cracking of the substrate is likely to mirror in the monolithic surfacing.

4.2 Hydrostatic pressure, water vapor gradient, and capillary action, or any combination of these, forced against or through the concrete may cause adhesion failure between the topping and the concrete surface. A waterproofing or drainage system may be required to address these concerns.

4.3 New concrete should be cured in accordance with good concrete practice. See ACI-308.

4.4 Film forming type curing membranes shall be removed from the surface of the concrete unless approved as being compatible by the surfacing manufacturer. The removal or compatibility of these materials can be verified by testing in accordance with 7.3.

4.5 In placing concrete floors, after the proper leveling of the concrete, it shall be wood float finished, followed by a single pass metal trowel finish to produce a relatively laitance-free substrate. Lubricants or release agents shall not be used on tools.

4.6 Care shall be taken in selection of release agents for forms to prevent contamination of concrete resulting in subsequent problems that could develop in bonding of the monolithic surfacing to the concrete.

4.7 Uneven concrete surfaces should be built up with a

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[2] *Annual Book of ASTM Standards*, Vol 04.05.

[3] *Annual Book of ASTM Standards*, Vol 06.02.

[4] Available from The American Concrete Institute, P.O. Box 19150, Detroit, MI 48219.

patching material approved by the surfacing manufacturer.

4.8 As a general rule, concrete substrates to receive resinous monolithic surfacings must:

4.8.1 Be designed such that the surfaces to be topped will remain integral and continuous since the surfacing will not bridge crack displacements.

4.8.2 Be free of laitance and contamination.

4.8.3 Exhibit a surface tensile strength of at least 300 psi (2 MPa) as determined by a surface tensile bond test.

4.8.4 Exhibit moisture content levels that are in compliance with the surfacing manufacturer's recommendations. See Test Method D 4263.

5. Surface Preparation

5.1 *New Concrete*:

5.1.1 Regardless of the method used to finish the concrete, it is necessary to ensure that all surfaces are free of laitance, oil, grease, and other materials incompatible with the surfacing. The concrete surfaces, also, must be free of fins, projections, bugholes, honeycombs, and loosely adhering concrete, dirt, and dust particles. Such methods as acid etching, abrasive blasting, or mechanical scarification may be used. See Practices D 4258, D 4259, D 4260, and Test Methods D 4262 and D 4285.

5.1.2 The prepared concrete shall have a roughened appearance which is desirable for enhancing adhesion of the monolithic surfacing. It shall be similar to the texture of coarse sandpaper or to a roughness standard as established by the material manufacturer.

5.2 *Old Concrete*:

5.2.1 Old concrete may exhibit a variety of surface conditions. These may range from a smooth finish to a rough finish with exposed aggregate. The concrete may have been painted or contaminated with oils, greases, fats, or chemicals. The pH of the concrete may be checked as an aid in evaluating the condition of the concrete. See Test Method D 4262.

5.2.2 Contaminated concrete shall be cleaned and neutralized. Methods include detergents, caustics, or acids. Paint or existing surfacings shall be removed by mechanical means. See Practice D 4258.

5.2.3 Uneven surfaces should be built up with a patching material approved by the surfacing manufacturer.

5.2.4 When cleaning and patching of the concrete surface has been completed, abrasive blasting or mechanical scarification may proceed.

5.2.5 The pH of the prepared concrete surface shall be between 8 and 10.5. See Test Method D 4262.

6. Methods of Concrete Surface Preparation

6.1 *Abrasive Blasting*—See Practice D 4259.

6.2 *Scarifying*—Scarify in accordance with surfacing manufacturer's recommendations to obtain the proper profile on the surface of the concrete.

6.3 *Alternate Methods*—As with other methods, the criterion of a clean strong concrete surface with good bonding profile must be maintained.

6.3.1 High pressure water cleaning, impact tools, and needle guns are alternate methods that can be used in the surface preparation of the concrete.

6.4 *Acid Etching*—In the past, acid etching has been considered as a complete, reliable method of surface preparation, but experience has indicated that it is not as dependable as mechanical abrasion. Acid etching is now only recommended for areas where no alternative means of surface preparation are possible. If acid etching must be employed, it should be performed by those experienced in its use. See Practice D 4260.

7. Tests for Surface Preparation of Concrete

7.1 *Moisture*—In cases where there is a question about the moisture content, evaluate the concrete in accordance with Test Method D 4263 or other suitable test procedures and treat surfaces in accordance with the surfacing manufacturer's recommendations.

7.2 *Temperature*—The surface temperature of the concrete and the ambient air temperature near to the concrete at the time of the monolithic application shall be in accordance with the surfacing manufacturer's instructions.

7.3 *Concrete Surface Tensile Bond Strength*—The surface tensile bond strength of the prepared concrete substrate may be determined by the *pipe cap bond test* which consists of bonding a commercial pipe cap to the concrete surface with epoxy, and attaching a test apparatus to the top of the pipe cap to measure the pulling force required to break the bond. See ACI 503R-89, Appendix A, Test Method A.1, Field Test for Surface Soundness and Adhesion. The results of such testing in 7.3 shall also show a portion of the concrete being pulled. If bond is lost at the surface of the concrete, even though the noted minimum tensile bond strengths are reached but no concrete is pulled, the suitability of the prepared surface may be in question.

8. Keywords

8.1 chemical-resistant monolithic surfacings; surface preparation