



Designation: D5295 – 00(Reapproved 2006)

# Standard Guide for Preparation of Concrete Surfaces for Adhered (Bonded) Membrane Waterproofing Systems<sup>1</sup>

This standard is issued under the fixed designation D5295; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This guide provides recommendations for the preparation of concrete surfaces prior to the application of adhered (bonded) waterproofing.

1.2 This guide is directed primarily toward installations of new concrete, but is also applicable for existing concrete installations. (See also ACI 116 and ACI 546.)

1.3 This guide does not apply to loose laid systems, bentonite systems, lead, or the like.

1.4 This guide does not apply to applications involving insulating concrete.

1.5 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.6 *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:<sup>2</sup>

[D1079 Terminology Relating to Roofing and Waterproofing](#)

[D4262 Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces](#)

[D4263 Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method](#)

### 2.2 ACI Standards:<sup>3</sup>

[ACI 116 Cement and Concrete Terminology](#)

[ACI 301 Specifications for Structural Concrete for Buildings](#)

[ACI 311 Guide to Inspection of Concrete](#)

[ACI 515 A Guide to the Use of Waterproofing, Dampproofing, Protective and Decorative Barrier Systems for Concrete](#)

[ACI 546 Repair of Concrete](#)

## 3. Significance and Use

3.1 The success of a waterproofing application depends on, among other things, the type, smoothness, and cleanliness of the concrete surface being coated. This guide describes conditioning or repairing of the concrete surface by the removal or other constructive modification of those surface defects that can affect the performance of the waterproofing system. It also covers surface preparation by chemical and blast cleaning methods in order to provide good adhesion between the waterproofing system and the concrete as well as the effect and control of various surface contaminants. (See also ACI 515.)

3.2 This guide is not intended to offer guidelines for the selection of a suitable waterproofing system; the use of specific application techniques; or the design and installation of flashing, terminations, expansion joint details, etc. (For definitions of terms, see Terminology [D1079](#).)

3.3 The recommended procedures described herein are minimums; the waterproofing materials manufacturer may require more strict or specific procedures for the preparation of concrete surfaces for the application of the manufacturer's specific system.

## 4. Adhesion Inhibitors

4.1 *General*—Among the items that inhibit the adhesion of membrane waterproofing systems are form release agents, concrete curing compounds, admixtures, laitance, moisture, and grease or oils.

4.2 Form release agents, such as oil, grease, wax, and silicones, will transfer to the surface of the concrete during casting. These will cause poor adhesion of waterproofing systems. Since these are almost invisible, it is difficult to detect their presence. Any procedure for the removal of such materials will be specific to that material. Proprietary form coating materials should be accepted prior to use and after evaluation

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> Available from American Concrete Institute (ACI), P.O. Box 9094, Farmington Hills, MI 48333.

by the specifier to determine that they are appropriate for use with the proposed waterproofing materials and systems. Proprietary paint systems applied to the forms that are non-transferable and formulated to prevent contamination of the concrete surface should be used.

4.3 Concrete curing compounds may contain waxes, resins, chlorinated rubber, or film formers of various types. If such materials must be used, the specifier should be certain that the materials can be completely removed or that the waterproofing system manufacturer has evaluated them for use with the manufacturer's system to determine that they are acceptable for such use. These materials should be accepted prior to use and after evaluation by the specifier to determine that they are appropriate for use with the proposed waterproofing materials and system.

4.4 Admixtures such as water-immiscible chemical curing agents are sometimes used in concrete. These should be avoided unless the specifier has determined that they are acceptable for use with the intended waterproofing materials. These materials should be accepted prior to use and after evaluation by the specifier to determine that they are appropriate for use with the proposed waterproofing materials and system.

4.5 Laitance, dust and dirt, moisture, and grease and oil can inhibit or impair adhesion of the waterproofing system. These must be removed; controlled in a manner acceptable to the waterproofing materials manufacturer; or found by the manufacturer to be non-detrimental to the adhesion and performance of the waterproofing system to be employed.

## 5. Repair of Surface Defects

5.1 *General*—Surface defects that may impair adhesion include honeycomb, fins, tie holes, “bug holes,” sharp offsets from displaced forms, rutted cracks, ragged corners, deviations in the surface plane, and other similar concrete defects, along with spalling and delaminations of the concrete surface. (See also, Concrete Manual.<sup>4</sup>)

5.2 Fins, protrusions, or similar irregularities should be cut back to the surface by chipping, bushhammering, needlegunning, or wirebrushing. Avoid polishing of the concrete surface by these techniques.

5.3 Sharp offsets in the surface, such as those caused by formwork misalignment, should be cut back to an even surface by chipping, bushhammering, needlegunning, wirebrushing, or transitioning with grout. This could also be performed in accordance with the applicable provisions of ACI 301 and 311. Avoid polishing the concrete surface by any of these techniques.

5.4 Sharp offsets between precast sections should be corrected as indicated in 5.5.

5.5 Defective concrete areas should be removed down to sound concrete, preferably by chipping; if grinding is necessary, care must be taken to avoid “polishing” the surfaces. If

sizable areas or amounts of unsound concrete are found, a structural engineer shall specify appropriate corrective action. Cracks exceeding 2 mm ( $\frac{1}{16}$  in.) should be investigated to determine whether they are still active. Such cracks should be chipped out before being patched, and edges should be undercut slightly, in accordance with the suggestions and recommendations of applicable portions of ACI 301 and 311, or as recommended by the manufacturer of the patching material. No feathered edges shall be permitted. Tie holes and “bug holes” larger than 16 mm ( $\frac{5}{8}$  in.) in diameter or deeper than 3 mm ( $\frac{1}{8}$  in.), or both, should be prepared similarly for patching.

5.5.1 The areas to be patched, along with a band at least 150 mm (6 in.) wide surrounding it, should be dampened before the patching application to prevent rapid absorption of water from the bonding grout and the patching mortar, or this can be performed in accordance with the applicable provisions of ACI 301 and 311.

5.5.2 Immediately after the surface water has evaporated from the dampening step, a bonding grout or bond coat, consisting of approximately one part of cement to one part of fine sand passing No. 30 mesh sieve with an amount of water sufficient to obtain a consistency of thick cream, should be brushed thoroughly into the surface, or this can be performed in accordance with the applicable provisions of ACI 301 and 311.

5.5.3 The patching mortar should be made from the same materials and in the same proportions as the concrete, with the exception of coarse aggregate. (In any case, use no more than one part cement to 2.5 parts sand.) Mix the patching mortar thoroughly with an amount of water sufficient only to obtain the stiffest consistency that will permit placement. Apply the mortar as soon as the bonding coat begins to lose the water sheen. Mortar should be worked thoroughly into place and struck off slightly higher than the surrounding area to allow for some initial shrinkage. Such patches should set for at least 1 hour before surface finishing and then be damp-cured for seven days. Any tie holes or “bug holes” should be filled completely with mortar. This can also be performed in accordance with the applicable provisions of ACI 301 and 311.

5.5.4 Proprietary materials may be used either in lieu of or in addition to the patching materials described in 5.5.3. Such compounds must be used in accordance with the manufacturer's instructions. These proprietary materials must be compatible with, and not interfere with, adhesion of the waterproofing system to be employed. Proprietary patching materials should be accepted prior to use and after evaluation by the specifier to determine that they are appropriate for use with the proposed waterproofing materials and system.

## 6. Surface Preparation

6.1 *General*—Most waterproofing systems depend on good adhesion to the concrete. This, in turn, depends on proper surface preparation. The concrete surfaces must be free of loose, weak, and unsound materials (including laitance), as well as any chemical contamination that may adversely affect the bond. Some tests for the adequacy of the surface preparation are reviewed (see also 7.5). The preparation and testing of

<sup>4</sup> Available from U.S. Bureau of Reclamation, Denver, CO, *Concrete Manual*, 8th Edition, 1975, pp. 393–429.