



## Standard Practice for Acid Etching Concrete<sup>1</sup>

This standard is issued under the fixed designation D 4260; 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 practice includes surface preparation of concrete to prepare the surface prior to the application of coatings.

1.2 This practice is intended to alter the surface profile of the concrete and to remove foreign materials and weak surface laitance.

1.3 *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.* For specific hazard statements, see Section 5.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

D 4258 Practice for Surface Cleaning Concrete for Coating<sup>2</sup>

D 4259 Practice for Abrading Concrete<sup>2</sup>

D 4262 Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces<sup>2</sup>

D 4263 Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method<sup>2</sup>

D 4541 Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers<sup>2</sup>

#### 2.2 Other Standard:

ACI-308 Recommended Practice for Curing Concrete<sup>3</sup>

### 3. Summary of Practice

3.1 This practice is intended to provide a clean, contamination-free, and roughened surface.

3.2 Acceptable surfaces shall be free of laitance, form release agents, curing agents, oil, grease, and other penetrating contaminants. The surface shall be free of fins, projections, and loosely adhering concrete, dirt, and dust particles.

3.3 For some applications, a minimum concrete surface strength may be required for proper coating performance.

### 4. Significance and Use

4.1 This practice is used to prepare concrete for coatings

where optimum bond is desired for service conditions such as continuous or intermittent immersion, temperature cycling, or mechanical loading.

### 5. Hazards

5.1 New concrete shall be cured in accordance with ACI-308.

5.2 Concrete cure compounds, form release materials, or concrete hardeners may require abrading, in accordance with Practice D 4259, as acid etching may not be effective.

5.3 All oil and grease shall be removed in accordance with Practice D 4258 prior to mechanical abrading, abrasive blast cleaning, water blasting, or acid etching.

5.4 Use and disposal of materials should conform to established federal, state, local, and project requirements.

### 6. Acid Etching Procedure

#### 6.1 Pre-Surface Preparation:

6.1.1 Remove grease, oil, and other penetrating contaminants (see Practice D 4258).

6.1.2 Remove fins and protruding surface irregularities by mechanical means.

6.1.3 Surfaces shall be free of standing water.

6.1.4 Some curing compounds may not be removed by acid etching and will require preparation by mechanical abrading, abrasive blasting, or water blasting in accordance with Practice D 4259.

#### 6.2 Suitable Surfaces:

6.2.1 This method is primarily suited for use on horizontal surfaces.

6.2.2 Other methods of preparation may be more suitable for rough concrete surfaces and walls or overhead surfaces.

#### 6.3 Acid Etching Solutions:

6.3.1 Typical solutions covered by this method are muriatic (hydrochloric), sulfamic, phosphoric and citric acids. Hydrochloric acid shall not be used where chlorides are prohibited.

6.3.2 The acid concentrations of etching solutions may vary, depending on the concrete texture and degree of etching required.

6.3.3 The concrete surface shall be pre-wet with water prior to applying etching solutions. Free-standing water shall be removed. Uniformly apply the etching solution to the wet surface. Polyethylene sprinkling cans are suitable for applying acid solutions. Bubbling should be uniformly evident. If not, this indicates the presence of grease or oil contamination, or

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 06.02.

<sup>3</sup> Available from American Concrete Institute, 22400 W. Seven Mile Rd., Detroit, MI 48219.

both, curing compounds or sealers, or a need to increase the concentration of the acid solution. Scrub the acid wetted surface with a stiff bristle brush.

6.3.4 When the etching solution bubbling begins to subside, flush surfaces to remove reaction products, and inspect for uniform roughening and removal of laitance. Repeat application of acid to obtain required surface.

6.3.5 After the desired roughening is achieved, thoroughly flush the surface with potable water. Repeated flushing and scrubbing with a stiff-bristled brush may be necessary to remove acid residues.

6.3.6 The acid etched surface shall be tested for pH in accordance with Test Method D 4262 and may be tested for moisture content in accordance with Test Method D 4263 prior to applying coating.

#### 6.4 *Appearance of Prepared Surface:*

6.4.1 The intent is to remove sufficient material in order to achieve a sound concrete surface free of laitance, glaze, efflorescence, and incompatible concrete curing compounds or form release agents.

6.4.2 The acid etched surface shall be uniformly roughened to a degree similar in appearance to a medium to coarse grade sandpaper. A roughness standard may be established by mutual agreement.

### 7. Inspection

7.1 Visually examine the prepared surface for loose ad-

hering concrete, thin crusts bridging voids, fins, and projections.

7.2 Visually examine the prepared surface for oil, grease, and markings.

7.3 Test surfaces cleaned by acid etching for pH in accordance with Test Method D 4263.

7.4 If required, surface strength may be determined in accordance with Method D 4541 or other agreed upon method.

### 8. Acceptance

8.1 Acceptable surfaces shall be free of laitance, oil, grease, and other materials incompatible with the coating. The surface shall also be free of fins, projections, and loosely adhering concrete, dirt, and dust particles.

8.2 The surface shall have a roughened, textured appearance. Aggregate may be exposed. Bug holes shall be opened.

8.3 A roughness standard may be established by mutual agreement.

8.4 If specified, the treated surface shall meet the surface strength requirements.

### 9. Keywords

9.1 acid etching; concrete; laitance; surface preparation

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