



## Standard Practice for Preparatory Surface Cleaning for Clay Brick Masonry<sup>1</sup>

This standard is issued under the fixed designation D 5703; 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 covers non-abrasive surface cleaning of clay brick masonry to remove surface contaminants such as dirt, grease, loose material, soot, fly ash, hydrocarbon residues, algae, etc. in preparation for the application of water repellent coatings without damaging or altering the surface appearance of the clay brick masonry.

1.2 Procedures included in this practice are water cleaning, detergent water cleaning, pressurized water cleaning, steam cleaning, and acid cleaning. It is not intended for the cleaning of newly constructed brick masonry. Use of procedures described in this practice may not be appropriate where the surface is of a historical nature.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.4 *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 information see Section 5 and Note 2 and Note 3.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

C 43 Terminology of Structural Clay Products<sup>2</sup>

### 3. Terminology

#### 3.1 Definitions of Terms Specific to This Standard:

3.1.1 *slurry*—a coating of finely ground clay, coloring agents, and water applied to the surface of clay brick during the manufacturing process prior to firing of the unit.

3.1.1.1 *Discussion*—Sand may also be added to the slurry.

3.2 For definitions of other terms found in this practice, refer to Terminology C 43.

### 4. Significance and Use

4.1 Surface cleaning is necessary to prepare clay brick masonry surfaces for application of coatings intended for water

repellent protection. Surface cleaning helps to ensure proper adhesion or even penetration of the coating and to prevent unintended sealing-in of stains.

4.2 This practice addresses surface cleaning only. Other preparation or remedial repairs, such as repointing the masonry or replacing of units, may be necessary and must be completed prior to application of the water repellent treatment.

### 5. Hazards

5.1 Localized stains (for example efflorescence and metallic stains) and previously applied coatings not compatible with the water repellent treatment may require removal by other surface cleaning methods. Failure to remove localized stains prior to application of the treatment may prevent later removal of the stain.

NOTE 1—Methods for removing localized stains, including use of non-proprietary chemical compounds, can be found in several references, some of which are listed in Appendix X1.

5.2 Do not perform water cleaning, detergent water cleaning, pressurized water cleaning, and acid cleaning at temperatures below 40°F.

5.3 Handle proprietary chemical cleaning products according to manufacturer's recommendations. Conform to established federal, state, local and project requirements for use and disposal of materials. Provisions for collecting and removing cleaning effluent may be necessary.

5.4 Use the minimum effective pressure if pressure washing equipment is employed for water cleaning or for flushing the surface for detergent water cleaning or chemical cleaning. Avoid excessive pressure that could damage the masonry surface.

### 6. Procedure

6.1 Water, detergent water, pressurized water, or scrubbing are acceptable cleaning methods. Acid cleaning agents may be used to remove surface deposits such as soot, fly ash, and hydrocarbon residues not removed by any of the above methods. Precede and follow chemical and detergent cleaning with a thorough fresh (potable) water rinse. Make provisions for the removal of cleaning effluent generated.

6.2 If necessary, test cleaned surfaces for moisture content prior to applying water repellent coating. Before and after cleaning, test surface to be cleaned with proprietary chemical compounds for pH.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol. 04.05.

6.3 Type and existing conditions of the substrate determine the selection of appropriate method(s). Select cleaning methods based on surface condition, clay brick unit color, mortar color, and brick texture. Units with a sand finish or slurry coated or glazed surface require special care. (See Appendix X1 for guidance on selection of a cleaning technique.)

6.4 Five types of cleaning procedures are described below. Prior to the initiation of cleaning, clean small test areas of approximately 20 ft<sup>2</sup> (1.9 m<sup>2</sup>) in inconspicuous areas of representative soiling by the selected procedure to determine effectiveness and to establish a standard for the work. One or more of the procedures may be required to remove contaminants from the masonry surface. Precautions on use are given where applicable.

6.4.1 *Water Cleaning*—Removes dust, dirt and water-soluble surface contaminants. Plain water cleaning may be by hand cleaning or pressurized cleaning.

6.4.1.1 *Hand Cleaning*—Clean the surface with a stream of clean portable water. When necessary, hand scrub with a nonmetallic stiff-bristled fiber brush.

NOTE 2—**Caution:** Brick masonry with surface coatings, such as sand finished or slurry coated, require extra care as scrubbing may damage or remove the surface coating.

6.4.1.2 *Pressurized Water Cleaning*—This method may be used with plain water or for pre-wetting in conjunction with detergent or chemical cleaning. Clean the surface with a stream of clean portable water, aimed at an oblique angle approximately 2 ft (0.6 m) from the surface, at the minimum pressure required to remove dust, dirt, and loose material without damaging the substrate. Pressure should never exceed 700 psi (4800 kPa) for plain water cleaning.

NOTE 3—**Caution:** This cleaning method is not appropriate for sand finished brick and brick with glazed coatings or slurries applied to the finished faces.

6.4.2 *Detergent Water Cleaning*—Removes water-soluble surface contaminants and oils, grease, and other emulsifiable materials on the surface.

6.4.2.1 Scrape off heavy deposits of grease or oil and pre-wet the surface with potable water. Clean the surface with a nonmetallic stiff-bristled fiber brush, using an aqueous solution of detergent or non-solvent emulsifier. Immediately after treatment, before the surface dries, remove residues of the cleaning agent by thoroughly flushing the surface with clean potable water. Do not exceed pressure of 50 psi (340 kPa) if pressurized water with a detergent additive is used. It is possible for detergent or chemical solutions to be driven into the masonry when applied under high pressure and become the source of future staining.

6.4.2.2 Repeat 6.4.2.1 until water does not bead on the surfaces.

6.4.3 *Acid Cleaning*—This procedure is similar to detergent water cleaning, but involves the use of proprietary acid cleaning compounds (generally muriatic hydrofluoric and phosphoric acids) for the removal of surface deposits such as soot, fly ash, and hydrocarbon residues.

6.4.3.1 *Precautions:*

(1) Do not use muriatic acid compounds on light colored (white, tan, buff, pink) or gray, brown or black colored brick units containing manganese. Manganese stains (“brown stain”) may result when acid is used to clean such units.

(2) Strong acid concentrations may etch or discolor brick and mortar joints.

(3) Acid cleaning is generally not recommended for masonry made with colored mortars since colored mortar may be bleached by the process.

6.4.3.2 Protect all adjacent materials and surrounding areas as recommended by the manufacturer of the proprietary acid cleaning compound.

6.4.3.3 Before applying the acid cleaning compound, pre-wet the surface thoroughly with potable water to prevent absorption of the cleaning solution within the pores of the masonry.

6.4.3.4 Apply a dilute solution of the cleaning compound to the pre-wet surface as recommended by the manufacturer. Leave the cleaning solution on the surface for the prescribed dwell period (usually less than 5 min). Do not apply at pressures exceeding 50 psi (340 kPa).

6.4.3.5 Immediately following the dwell period, and before the surface dries, flush thoroughly with clean potable water to wash chemical cleaning compounds from the surface, then rinse thoroughly from bottom to top. (Rinsing from bottom to top helps to avoid surface streaking). Repeated flushing may be necessary to remove cleaning residues.

## 7. Evaluation

7.1 Surface cleaning is intended to provide a clean, contamination-free surface without damaging the brick masonry surfaces. Visually examine the cleaned surface to evaluate removal of contaminants. Acceptable surfaces shall be free of oil, grease, and other contamination such as dirt, soot, ash, and hydrocarbon residues.

## 8. Keywords

8.1 brick masonry; substrate preparation; surface cleaning; water repellent coating

**APPENDIX**
**(Nonmandatory Information)**
**X1. COMMENTARY**

X1.1 This practice covers methods appropriate for the general cleaning of clay brick masonry surfaces. Selection of a cleaning method is dependent upon the characteristics of the brick masonry such as brick color, brick texture, mortar color, and condition of the masonry. Table X1.1 provides guidelines for the selection of a cleaning methods based on the characteristics of the masonry.

X1.2 Cleaning may also involve localized stains. Such stains may be caused by reaction of the masonry to previously applied chemicals or by external materials contacting the masonry. The key to the removal of localized stains is first identifying the stain. Several guides provide recommendations on techniques and cleaning agents for removing specific stains.<sup>3,4</sup>

**TABLE X1.1 Guidelines for Selection of a Cleaning Method for Clay Brick Masonry**

Brick Color	Recommendations
Red Light Colors and Browns	Most methods of cleaning may be used. Do not use muriatic acid. Clean with plain water, detergents or suitable proprietary compounds. Light colored units are more susceptible to acid burn and stains.
Brick Texture	Recommendations
Smooth	Stains and contaminants are generally easily removed.
Rough	Dirt stains tend to penetrate deep into recesses. Provide additional water for pre-wetting and rinsing. Pressurized water cleaning is more effective than plain water.
Sand finished and slurry coated	Clean with plain or detergent water and scrub brush using light pressure. Do not use heavy scrubbing or pressurized cleaning.
Glazed	Most methods of cleaning are suitable. Do not use acid on glazed brick. Do not use metal cleaning tools or brushes. Avoid heavy scrubbing and pressurized cleaning.
Mortar Color	Recommendations
Gray	Most methods of cleaning are suitable. Strong concentrations of acid may etch or discolor mortar joints.
Pigmented	Most acids tend to bleach colored mortars. Mild detergent solutions are generally recommended.
Condition of Masonry	Recommendations
Sound surfaces and hard mortar joints	Most methods of cleaning are suitable.
Crumbly surfaces and loose particles	Special care is required. Avoid pressurized cleaning methods.

<sup>3</sup> Grimm, C. T., "Cleaning Masonry—A Review of the Literature," Construction Research Center, University of Texas at Arlington, 1988.

<sup>4</sup> "Cleaning Brick Masonry," *Technical Notes on Brick Construction 20 Revised II*, Brick Institute of America, 1990.

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