



Standard Practice for Preparatory Surface Cleaning of Architectural Sandstone¹

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1. Scope

1.1 This practice covers non-abrasive surface cleaning of architectural sandstone to remove grease, dirt, loose material, and surface deposits such as soot, fly ash, hydrocarbon residues, and algae and other biological growth in preparation for the application of water repellent coatings. Procedures include broom cleaning, vacuum cleaning, air blast cleaning, water cleaning (and detergent water cleaning), and chemical cleaning.

1.2 *Limitations*—This practice is intended to clean architectural sandstone without damaging it or altering the surface profile. These procedures are not intended for interior stonework. Where work on surfaces of artistic, architectural, cultural, or historic significance is being considered, guidance from specialists should be sought.

1.3 The values stated in SI 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 statements, see Section 4.

2. Referenced Documents

2.1 *ASTM Standards:*²

- C119 Terminology Relating to Dimension Stone
- 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
- D4285 Test Method for Indicating Oil or Water in Compressed Air

¹ This practice is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.47 on Concrete, Stone and Masonry Treatments.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

3. Significance and Use

3.1 Surface cleaning is necessary to prepare architectural sandstone surfaces for application of coatings intended for water repellent protection. Surface cleaning of the sandstone substrate helps to ensure proper adhesion of the coating.

3.2 Use of procedures described in this practice may not be adequate where protective systems will be used for continuous or intermittent immersion or mechanical loading.

4. Hazards

4.1 Moisture in the architectural sandstone may be detrimental to coating adhesion or (in some cases) cure. Moisture content shall be in compliance with coating manufacturer's recommendation. See also Test Method D4263.

4.2 Localized staining (for example efflorescence and metallic staining) and previously applied coatings or preservative treatments not compatible with the treatment may require removal by other surface preparation methods.

4.3 Water cleaning, detergent water cleaning, and chemical cleaning should not be performed at temperatures below 40°F.

4.4 Many chemical cleaning products contain acids and should be handled according to manufacturers' recommendations. Use and disposal of materials should conform to established federal, state, local, and project requirements.

4.5 If pressure washing equipment is employed for water cleaning or for flushing the surface with detergent water cleaning or chemical cleaning, the minimum effective pressure should be used. Avoid excessive pressures that could damage the sandstone substrate.

5. Procedure

5.1 Air blast, water, scrubbing, sweeping, or vacuuming are acceptable cleaning methods. Chemical 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. Chemical cleaning should be preceded and followed by a thorough fresh water rinse.

5.2 Existing conditions of the substrate will determine the selection of appropriate procedure(s). Prior to the initiation of cleaning, small test areas should be cleaned in inconspicuous areas by the selected procedure to determine effectiveness.

5.3 The six types of cleaning procedures are described below. One or more of the procedures may be required to remove contaminants from the sandstone surface:

5.3.1 *Broom Cleaning*—Removes most loosely adherent solid contaminants.

5.3.1.1 Working from top to bottom, sweep the surface with a clean industrial stiff-bristled broom or similar device. Remove sweepings from the immediate work area.

5.3.1.2 Clean broom-cleaned surfaces again, using one or more of the surface preparation procedures specified in 5.3.2 through 5.3.6.

5.3.2 *Vacuum Cleaning*—Removes surface dust and other debris.

5.3.2.1 Vacuum the surface with a heavy-duty type industrial vacuum to provide an essentially dust-free surface.

5.3.3 *Air Blast Cleaning*—Removes debris, dust, dirt, loosely adherent architectural sandstone, and laitance from surfaces to provide an essentially sound, dust-free surface.

5.3.3.1 Clean surface with a compressed-air stream through a blasting nozzle held at an oblique angle approximately 0.6 m (2 ft) from the surface. Air stream pressure should not exceed 689 kPa (100 psi).

5.3.3.2 Before initiating air-blast cleaning, verify that the air stream is free of oil in accordance with Test Method D4285.

5.3.3.3 Surface cleanliness requires carrying off airborne dust before it is redeposited. Vacuum cleaning may be required to remove redeposited dust.

5.3.4 *Water Cleaning*—Removes dust, dirt, and water-soluble surface contaminants.

5.3.4.1 Clean the surface with a stream of clean potable water, aimed at an oblique angle approximately 0.6 m (2 ft) from the surface, having sufficient pressure to remove dust, dirt, and loose material without damaging the substrate. When necessary, hand scrub with a nonmetallic stiff-bristled fiber brush.

5.3.4.2 Prior to water cleaning, make provisions for the removal of wash water and contaminants generated.

5.3.4.3 If necessary, test the cleaned surface for moisture content in accordance with Test Method D4263 prior to applying coatings.

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

5.3.5.1 Scrape off heavy deposits of grease or oil and prewet the surface with potable water. Clean the surface with a nonmetallic stiff-bristled fiber brush, using an aqueous solution of detergent or nonsolvent emulsifier. Immediately after treatment, before the surface dries, remove residues of the cleaning agent by thoroughly flushing the surface with clean potable water. Repeat flushing until the pH of the surface water meets the acceptance criteria of Test Method D4262.

5.3.5.2 Repeat 5.3.5.1 until water does not bead on the surface.

5.3.5.3 Prior to detergent water washing, make provisions for the removal of wash water and contaminants generated.

5.3.5.4 If necessary, test the cleaned surface for moisture content in accordance with Test Method D4263.

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

NOTE 1—In some cases, removal of heavy soiling may require use of alkaline pretreatment prior to acidic cleaning.

5.3.6.1 Chemical cleaning using acidic products is generally not recommended for calcareous sandstones. (See Terminology C119.)

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

5.3.6.3 Prior to chemical cleaning, provide for application to small test area to determine effectiveness. Make provisions for the removal of water and contaminants generated during full-scale cleaning operations.

5.3.6.4 Before applying the chemical cleaning compound, prewet the surface thoroughly with potable water to prevent absorption of the cleaning solution within the pores of the masonry.

5.3.6.5 Apply a dilute solution of a proprietary cleaning compound to the pre-wet surface as recommended by the manufacturer. Leave the cleaning solution on the surface for a prescribed dwell period (usually less than 5 min).


5.3.6.6 Immediately following the dwell period, and before the surface dries, flush thoroughly 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.) Repeat flushing may be necessary to remove cleaning residues.

5.3.6.7 *Evaluation*—Visually examine the prepared surface to evaluate removal of debris, dust, dirt, oil, grease, loosely adherent sandstone building stone, and other contaminants. Test the surfaces cleaned with proprietary chemical cleaning compounds for pH in accordance with Test Method D4262 and if necessary test for moisture content in accordance with Test Method D4263 prior to applying coatings.

5.4 Surface cleaning is intended to provide a clean, contamination-free surface without damaging or removing architectural sandstone from intact, sound surfaces. Acceptable surfaces shall be free of oil, grease, loosely adhering sandstone, and other contamination such as dirt, soot, fly ash, and hydrocarbon residues.

6. Keywords

6.1 cleaning; sandstone; surface preparation

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