

SSPC: The Society for Protective Coatings

SURFACE PREPARATION STANDARD NO. 2

Hand Tool Cleaning

1. Scope

1.1 This standard contains the requirements for hand tool cleaning to remove loose detrimental foreign matter from steel substrates.

1.2 This standard differs from SSPC-SP 3, Power Tool Cleaning, in that SSPC-SP 3 requires use of powered hand-held tools. This standard requires use of hand-held tools without supplemental power.

1.3 Units of Measure: This standard makes use of both the IEEE/AST SI 10⁽¹⁾, International Standards (SI) units and U.S. Customary units. The measurements are not exact equivalents; therefore, each system must be used independently of the other without combining in any way. This standard uses SI units with the U.S. Customary conversions shown in parentheses.

2. Definitions

2.1 Hand tool cleaning is a method of preparing steel substrates with hand-held tools without supplemental power.

2.2 A hand tool cleaned surface, when viewed without magnification, shall be free of visible deposits of oil and grease, and all loose mill scale, loose rust, loose paint, and other loose foreign matter. It is not intended that adherent material be removed by this process. Material is considered adherent if it cannot be removed by lifting with a dull flexible putty knife as described in Section 6.3 (see also Notes 8.1 and 8.2).

2.3 DULL PUTTY KNIFE (for use as an inspection tool): A commercially manufactured, straight, flexible metal blade capable of returning to its original shape without permanent distortion after being bent by hand around a 28- to 33-cm (11 to 13-in) diameter mandrel (or pipe or other curved surface). The blade shall also have the following characteristics: length of approximately 75 to 125 mm (3 to 5 in); thickness of approximately 760 to 1270 μm (30 to

50 mils); and a straight working edge approximately 40 to 75 mm (1.5 to 3 in) in width. The putty knife is acceptable for use if the thickness at the working edge of the blade is not less than 635 μm (25 mils) or 75% of its original thickness, whichever is greater.⁽²⁾

NOTE: Some commercially manufactured, straight, flexible metal blades are between 500 and 760 μm (20 and 30 mils) in thickness. New blade thicknesses between 500 and 760 μm (20 and 30 mils) are permitted, provided the coating being tested is 20 mils or less in thickness, and the thickness of the blade is not worn to less than 20 mils.

2.4 Reference photographs of cleaned surfaces found in SSPC-VIS 3 are often used to supplement the written definition. In any dispute, the written definition set forth in this standard shall take precedence over reference photographs (see Note 8.3).

3. Referenced Documents

3.1 The latest issue, revision, or amendment of the referenced documents in effect on the date of publication of this standard shall govern unless otherwise specified. Documents marked with an asterisk (*) are not requirements of this standard.

3.2 If there is a conflict between the requirements of any of the cited standards and this standard, the requirements of this standard shall prevail.

3.3 ASTM INTERNATIONAL STANDARDS

ASTM D4285	Standard Test Method for Indicating Oil or Water in Compressed Air
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3.4 SSPC STANDARDS AND JOINT STANDARDS

SSPC-SP 1	Solvent Cleaning
* SSPC-SP 3	Power Tool Cleaning
* SSPC-SP 11	Power Tool Cleaning to Bare Metal
* SSPC-SP 7/ NACE No. 4	Brush-Off Blast Cleaning

⁽¹⁾ ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959. 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.

⁽²⁾ Exact dimensions of equipment manufactured using S.I. units may vary slightly from the S.I. values provided.

- * SSPC-SP 15 Commercial Grade Power Tool Cleaning
- * SSPC-SP COM Surface Preparation Commentary
- * SSPC-VIS 3 Guide and Reference Photographs for Steel Surfaces Prepared by Power- and Hand Tool Cleaning

4. Tools and Methods for Hand Tool Cleaning

4.1 TOOLS: Any hand-held tool that will remove loose material. Examples include, but are not limited to: hammers, wire brushes, scrapers, knives, and abrasive paper, pads, and stones. Hand tool cleaning does not alter or create a surface profile.

4.2 The use of multiple tools is sometimes necessary to achieve a surface meeting the requirements of Section 2.2.

5. Procedures Prior to Hand Tool Cleaning

If the surface is to be coated, visible deposits of oil, grease, or other materials that interfere with coating adhesion shall be removed in accordance with SSPC-SP 1 or other specified methods prior to hand tool cleaning.

6. Procedures Following Hand Tool Cleaning and Immediately Prior to Coating

6.1 Visible deposits of oil, grease or other materials that interfere with coating adhesion shall be removed in accordance with SSPC-SP 1 or as specified.

6.2 Dust and loose residues shall be removed from hand tool cleaned surfaces by brushing; blowing off with clean, dry air verified in accordance with the procedure described in ASTM D4285; vacuum cleaning; or other methods established in the procurement documents (project specification).

6.3 When using a dull putty knife to test paint, mill scale, or rust remaining on the surface after cleaning, the straight working edge of the blade shall be held flat against the surface at a maximum of 45 degrees to the surface and pushed with light to moderate pressure so that the end of the blade remains in flat contact with the surface. The corners of the blade shall not be used to dig at the residues. A putty knife shall not be used as an inspection tool if the working edge of the blade is nicked or gouged, or if dry paint or other material is present along the working edge that would prevent the blade from making intimate contact with the surface.

6.4 Immediately prior to coating application, the entire surface to be coated shall comply with the requirements of Section 2.2 (see Notes 8.4, 8.5 and 8.6).

7. Disclaimer

7.1 This is a consensus standard developed by SSPC: The Society for Protective Coatings. While every precaution is taken to ensure that all information furnished in SSPC standards and specifications is as accurate, complete, and as useful as possible, SSPC cannot assume responsibility nor incur any obligation resulting from the use of any materials, coatings, or methods specified herein, or of the specification or standard itself.

7.2 This standard does not attempt to address problems concerning safety and health associated with its use. The user of this standard, as well as the user of all products or practices described herein, is responsible for instituting appropriate health and safety practices and for ensuring compliance with all applicable governmental regulations.

8. Notes

Notes are not requirements of this standard.

8.1 FUNCTION: The type of hand tool surface preparation described in this standard removes loosely adherent material. This standard is suitable where removal of loosely adherent foreign matter is required, but where the effort to remove all tightly adherent rust, mill scale, old coatings, and other tightly adherent foreign matter is not necessary. The surfaces prepared according to this standard should not be compared to surfaces cleaned by abrasive blast cleaning or power tool cleaning. Although this method produces surfaces that resemble SSPC-SP 7 (brush-off blast cleaned) or SSPC-SP 3, (power tool cleaned surfaces), they are not necessarily equivalent to those surfaces produced by abrasive blast cleaning or power tool cleaning. The contracting parties should agree on the appropriateness of the finished surface to accept the specified coating system. Selection of hand tools and cleaning media should be based on (1) the condition of the surface prior to surface preparation; and (2) the extent of cleaning that is required.

The SSPC Surface Preparation Commentary (SSPC-SP COM) provides additional information on subjects related to hand tool cleaning. The recommendations contained in SSPC-SP COM are believed to represent good practice, but are not to be considered requirements of this standard.

8.2 STRATIFIED RUST, PACK RUST AND RUST SCALE: As noted in Section 4.3.1 of SSPC-COM, Surface Preparation Commentary for Steel and Concrete Substrates, stratified rust, pack rust or rest scale can adhere so tightly to the base metal that a wire brush will not remove it. Even though it is considered "tightly adherent" because it cannot be lifted with a dull flexible putty knife, it provides a very poor surface to paint over. Specifiers should consider providing

additional instructions in the project specification regarding the acceptable methods for, and the acceptable level of, removal of these types of rust.

8.3 VISUAL GUIDES AND COMPARATORS: Note that the use of visual guides or comparators in conjunction with this standard is required only when they are specified in the procurement documents (project specification) covering the work. It is recommended, however, that the use of visual guides or comparators be made mandatory in the procurement documents.

SSPC-VIS 3 provides a suitable comparative visual guide for SSPC-SP 2, SSPC-SP 3, SSPC-SP 11, and SSPC-SP 15. However, visual comparators for blast-cleaned steel (e.g. VIS 1) are not suitable for assessing hand tool cleaned surfaces. Because hand tool cleaning is time- and labor-intensive, it is advisable to prepare a test area of 1 x 1 m (3 x 3 ft) for large areas or 30 x 30 cm (12 x 12 in) for spot cleaning to an acceptable level agreed upon by the contracting parties, then cover it with a clear lacquer to save it as a standard during the power tool cleaning operation. A 30 x 30 cm (12 x 12 in) steel test plate can also be hand tool cleaned to an acceptable level and photographed or retained to serve as a project standard.

8.4 MAINTENANCE AND REPAIR PAINTING: When this standard is used in maintenance painting, specific instructions should be given on the extent of surface to be hand tool cleaned, including any additional requirements for retaining old paint, removing unsound paint, feathering and

spot cleaning. If the procurement documents require hand tool cleaning to prepare surfaces for subsequent coating, the edges of remaining intact coatings should be feathered to improve the appearance of the repaired coating

8.5 SURFACE IMPERFECTIONS: Surface imperfections can cause premature failure when the environment is severe. Generally, coatings tend to pull away from sharp edges and projections, leaving little or no coating to protect the underlying steel. Other features that are difficult for a coating to properly cover and protect include crevices, weld porosity, laminations, etc. Poorly adherent contaminants, such as weld slag residues, loose weld spatter, and some minor surface laminations, be removed during hand tool cleaning. Other surface defects may not be evident until the surface preparation has been completed. Therefore, proper planning for such repair work is essential, since the timing of the repairs may occur before, during, or after hand tool cleaning operations.

8.6 DEW POINT: Moisture condenses on any surface that is colder than the dew point of the surrounding air. It is recommended that the temperature of the steel surface be at least 3 °C (5 °F) above the dew point during hand tool cleaning. It is advisable to visually inspect for moisture and periodically check the surface temperature and dew point during cleaning. It is equally important to continue to monitor the surface temperature/dew-point relationship until the coating is applied to avoid painting over a damp surface, unless the selected coating is specifically intended for application on damp substrates.

This revision replaces the version dated November 1, 1982 (Editorial Revisions November 2004). Content has been reorganized to parallel construction of SSPC-SP 11 and SSPC-SP 15, and definition of a dull putty knife has been added. A redline version is available from SSPC upon request.

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