

SSPC: The Society for Protective Coatings

SURFACE PREPARATION STANDARD NO. 11

Power Tool Cleaning To Bare Metal

1. Scope

1.1 This standard defines three levels of cleanliness for carbon steel substrates prepared using power tools, summarized in Table 1. Required procedures and equipment for achieving these levels are also included.

1.2 The power tool cleaning levels defined in this standard may be specified if a roughened, clean, carbon steel surface is required, but where abrasive blasting is not feasible or permissible (see Notes 8.1 and 8.2). Level 2 cleaning is the default level if no level is specified.

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

2. Definitions

2.1 Bare Metal Power Tool Cleaning Levels

2.1.1 A Level 1 bare metal power tool cleaned surface, including the bottoms of pits on pitted surfaces, when viewed without magnification, shall be free of all visible oil, grease, dust, dirt, mill scale, rust, coating, corrosion products, stains, and other foreign matter (see Notes 8.1 and 8.3). The surface profile of the unpitted areas shall be a minimum of

25 μm (1.0 mil) unless a higher value is specified. The peaks and valleys on the prepared surface shall form a continuous pattern with no smooth, unprofiled areas.

2.1.2 A Level 2 bare metal power tool cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dust, dirt, mill scale, rust, coating, corrosion products, stains, and other foreign matter. Trace amounts of coating and corrosion products are permitted to remain in the lower portion of pits on pitted substrates (see Notes 8.1 and 8.3). The surface profile of the unpitted areas shall be a minimum of 25 μm (1.0 mil), unless a higher value is specified. The peaks and valleys on the prepared surface shall form a continuous pattern with no smooth, unprofiled areas. Level 2 shall be the default Level unless otherwise specified.

2.1.3 A Level 3 bare metal power tool cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dust, dirt, mill scale, rust, coating, corrosion products, and other foreign matter. Random staining consisting of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coating shall be limited to no more than 5 percent of each unit area of surface (approximately 5,800 mm² [9 in²] (i.e., a square 76 mm x 76 mm [3 in x 3 in])). In addition, trace amounts of coating and corrosion products are permitted to remain in the lower portions of pits on pitted substrates (see Notes 8.1 and 8.3). The surface profile shall be a minimum of 25 μm (1.0 mil) unless a higher value is specified. The peaks and valleys on the prepared surface

⁽¹⁾ ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, tel. +1-610-832-9500. Standards are available online at <<https://www.astm.org>>

TABLE 1
SUMMARY OF CLEANING LEVEL REQUIREMENTS

Level	Percent Overall Staining	Amount of Residue Permitted in Pit Bottoms	Minimum Profile ^(A)
1	0%	None	25 μm (1.0 mil); deeper if specified
2 ^(B)	0%	Traces in bottoms	25 μm (1.0 mil); deeper if specified
3	5%	Traces in bottoms	25 μm (1.0 mil); deeper if specified

^(A) minimum profile of 25 μm (1.0 mil) is required, but the equipment is capable of providing a profile of 50 μm (2 mils) or deeper.

^(B) If a level is not specified, Level 2 is the default.

This standard was originally issued in 1987 by the SSPC C.2.3 Committee on Power Tool Cleaning. It was revised in 2000, 2004, 2012, and 2020..

shall form a continuous pattern with no smooth, unprofiled areas.

2.2 Unless otherwise specified, profile measurements shall be obtained using ASTM D4417 Methods B, C, or D. SSPC-PA 17 shall be used to determine compliance with specified profile (see Note 8.4).

2.3 Acceptable variations in appearance that do not affect surface cleanliness as defined in Section 2.1 include variations caused by type of steel, original surface condition, thickness of the steel, weld metal, mill or fabrication marks, heat treating, heat-affected zones, or the texture and features associated with the use of a particular power tool.

2.4 Reference photographs of surfaces power-tool cleaned to SSPC-SP 11 Level 3 (see Note 8.3) 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. Additional information on reference photographs is in Note 8.3. An example of specification language is provided in Note 8.5.

3. Referenced Standards

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

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

3.3 SSPC STANDARDS:

SSPC-PA 17	Procedure for Determining Conformance to Steel Profile/Surface Roughness/Peak Count Requirements
SSPC-SP 1	Solvent Cleaning
* SSPC-SP 3	Power-Tool Cleaning
* SSPC-SP 5/ NACE No. 1	White Metal Blast Cleaning
* SSPC-SP 15	Commercial Grade Power-Tool Cleaning
SSPC-VIS 3	Guide and Reference Photographs for Steel Surfaces Prepared by Power- and Hand-Tool Cleaning

3.4 ASTM INTERNATIONAL STANDARDS:

ASTM D4285	Method for Indicating the Presence of Oil or Water in Compressed Air
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ASTM D4417

Standard Test Methods for Field Measurement of Surface Profile of Blast-Cleaned Steel

4. Tools and Methods for Power-Tool Cleaning to Bare Metal

4.1 POWER TOOLS: Any hand-held motorized tool that will produce a steel surface meeting the requirements of the specified level from Section 2.1.1, 2.1.2, or 2.1.3 is acceptable. Note 8.6 describes the two main categories of power tools. Notes 8.7, 8.8, and 8.9 provide additional information about tool selection.

4.2. The use of several different power tools meeting the requirements of Section 4.1 is sometimes necessary to achieve a bare metal power-tool cleaned surface. It is possible for power tools to alter an existing surface profile.

4.3 If the procurement documents require power-tool cleaning to prepare surfaces for subsequent coating, the edges of remaining intact coatings shall, unless otherwise specified, be feathered to improve the appearance of the repaired coating (see Note 8.2).

5. Procedures Prior to Power-Tool Cleaning

5.1 Prior to power-tool cleaning, 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.

5.2 Surface imperfections such as slivers and laminations, sharp edges, weld spatter, or burning slag shall be removed from the surface to the extent specified by the procurement documents [project specifications] (see Note 8.10).

5.3 Cleanliness of the compressed air used in air-driven tools shall be verified in accordance with the procedure described in ASTM D4285.

6. Procedures Following Power-Tool Cleaning and Immediately Prior to Coating

6.1 Visible deposits of oil, grease, or other contaminants shall be removed in accordance with SSPC-SP 1 or as specified.

6.2 Dust and loose residues shall be removed from power-tool cleaned surfaces by brushing, vacuum cleaning, or other methods established in the procurement documents (project specification).

6.3 After power-tool cleaning, any remaining surface imperfections as described in Section 5.2 (e.g., laminations, sharp edges, weld spatter, burning slag, scabs, slivers)