

SSPC: The Society for Protective Coatings

SURFACE PREPARATION STANDARD NO. 17

Thorough Abrasive Blast Cleaning of Non-Ferrous Metals

Foreword

This standard contains requirements for thorough abrasive blast cleaning of coated or uncoated metal surfaces other than carbon steel prior to the application of a protective coating system. This standard is used when the objective is to remove all visible contaminants from the surface and allows random color variation on no more than 5% of each unit area of surface. Surface preparation using this standard is used to provide a greater degree of cleaning than brush-off blast cleaning of stainless steels and non-ferrous metals (SSPC-SP 16). This standard represents a degree of cleaning that is similar to that defined for carbon steel substrates in SSPC-SP10/NACE No. 2.

In this standard, the terms *shall* and *must* are used to state mandatory requirements. The term *should* is used to state something considered good and recommended but not mandatory. The term *may* is used to state something considered optional.

1. Scope

1.1 This standard defines the “Thorough Abrasive Blast Cleaning” level of surface cleanliness achieved using abrasive blast cleaning on uncoated or coated non-ferrous or stainless-steel surfaces. The standard also includes requirements for materials and procedures used to achieve and verify the cleanliness level. This standard is for the preparation of non-ferrous metals for coating application and should not be used for carbon steel substrates. The primary functions of blast cleaning before coating are:

- (a) To remove material from the surface that can cause premature failure of the coating system; and
- (b) To obtain a suitable surface profile (roughness) to enhance the adhesion of the new coating system.

1.2 Substrates that may be prepared by this method include but are not limited to: copper and copper alloys, aluminum and aluminum alloys, and stainless steel. Sections A1 through A3 of Appendix A include special considerations for three families of alloys. Personnel performing abrasive blasting should be able to identify the alloy family from material test reports, design information, or field testing.

This standard developed by the SSPC C 2 20 Abrasive Blast Cleaning of Non-Ferrous Metals Committee was first issued in September 2019

1.3 Because of the possible variations in the appearance of substrates covered by this standard, the contractor is required to prepare a sample area to serve as a Job Reference Standard (JRS) for the degree of surface preparation. Section 3.3 describes this requirement in more detail.

1.4 This standard is limited to requirements for visible surface contaminants. Information on nonvisible contamination is in Section A4 of nonmandatory Appendix A.

1.5 Information about the use of this standard in maintenance coating work is in Section A5 of Appendix A.

1.6 This standard provides both IEEE/ASTM⁽¹⁾ SI 10 International System Units (SI) units and U.S. Customary units. SI Units are presented first, with a conversion into approximate U.S. custom units shown in parentheses. The conversions are not exact; therefore, each system must be used independently of the other.

2. Definitions

2.1 Thorough Abrasive Blast Cleaned Surface:

A thorough abrasive blast cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dust, dirt, oxides (corrosion products), coating, and other foreign matter. Random color variations shall be limited to no more than 5% of each unit area of surface (approximately [~] 5,800 mm² [9.0 in²] (i.e., a square 76 mm x 76 mm [3.0 in x 3.0 in]), and may consist of light shadows, slight streaks, or minor discolorations. Section A6 of Appendix A provides additional information about color variation. Section A7 of Appendix A provides an example of a specification statement.

2.2 The entire metal surface shall be subjected to the abrasive blast to achieve the specified degree of cleaning and to produce a dense and uniform surface profile (e.g., depth and texture) on the bare metal substrate. The peaks and valleys on the surface shall form a continuous pattern, leaving no smooth, unprofiled areas.

2.3 Immediately prior to coating application, the entire surface shall comply with the degree of cleaning as specified herein. Section A8 of Appendix A provides additional information regarding time from blast until coating application.

(1) IEEE/ASME S 10, American National Standard for Metric Practice, ASME International, West Conshohocken, PA, 2017, <<https://www.asme.org>>

3. Additional Technical Considerations

3.1 Acceptable variations in appearance that do not affect surface cleanliness as defined in Section 2.1 include variations caused by the metal composition, original surface condition, thickness of the metal, weld metal, fabrication marks, heat-treating, heat-affected zones, blasting abrasive(s), and differences resulting from the abrasive blast pattern.

3.2 It is possible for aggressive blast cleaning to significantly erode some alloys and soft metals (such as copper and some aluminum alloys). Additional information on specific metals is contained in Sections A1 through A3 of Appendix A. It is also possible for aggressive abrasive blast cleaning to distort thin shapes. Additional information on potential substrate damage is contained in Sections A9 and A10 of Appendix A.

3.3 The contractor shall prepare a sample area to serve as a Job Reference Standard (JRS) for the degree of surface preparation. The sample area shall be representative of the surface to be cleaned. The sample area shall be either a separate specimen or a designated portion of the actual surface. Following acceptance by the contracting parties, the JRS shall be documented, preserved, or both, to serve as a reference for the execution of the project, and all documentation shall be retained as part of the project records. In any dispute, the written definition set forth in this standard shall take precedence over the JRS or other visual comparators.

4. Referenced Documents.

4.1 The latest issue, revision, or amendment of the standards listed in Sections 4.3 through 4.6 shall govern unless otherwise specified. Standards marked with an asterisk (*) are referenced only in the Notes, which are not requirements of this standard.

4.2 If there is a conflict between the requirements of any of the standards listed in Sections 4.3 through 4.6 and this standard, the requirements of this standard shall prevail.

4.3 SSPC Standards, Guides and Publications

SSPC-SP 1	So vent Clean ng
SSPC-SP 16	Brush-Off Blast Clean ng of Coated and Uncoated Galvan zed Steel, Stainless Steels, and Non-Ferrous Metals
SSPC-AB 1	M neral and Sag Abras ves
SSPC-AB 2	Clean ness of Recycled Ferrous Metal c Abras ves
SSPC-AB 4	Recyclable Encapsulated Abras ve Media (n a compress b e ce u ar matr x)

* SSPC-PA 2	Procedure for Determin ng Compliance to Dry Coat ng Thickness Requirements
SSPC-PA 17	Procedure for Determin ng Conformance to Steel Profile/Surface Roughness/Peak Count Requirements
* SSPC-PA Guide 4	Guide to Maintenance Repair ng with Organic and A kyd Paint ng Systems
* SSPC-Guide 15	Field Methods for Retreatment and Analysis of Substrates on Steel and Other Nonporous Substrates
* SSPC-SP COM	Surface Preparation Commentary for Steel Substrates

4.4 ASTM International Standards

ASTM D4285	Method for Determin ng Presence of Oil or Water n Compressed Air
* ASTM D4417	Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel
* ASTM D7127	Standard Test Method for Measurement of Surface Roughness of Abrasive Blast Cleaned Metal Surfaces Using a Portable Stylus Instrument
* ASTM F21	Standard Test Method for Hydrophobic Surface Films by the Atomizer Test
* ASTM F22	Standard Test Method for Hydrophobic Surface Films by the Water-Break Test

4.5 NACE International Standard ⁽²⁾

* SP 0178	Design, Fabrication, and Surface Finish Practices for Tanks and Vessels to be Lined for Immersion Service
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4.6 Federal Standards⁽³⁾

A-A-59316	Commercial Item Description – Abrasive Materials; for Blast ng
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5. Procedures Before Abrasive Blast Cleaning

5.1 Pre-cleaning: Before blast cleaning, visible deposits of oil, grease, or other contaminants shall be removed in accordance with SSPC-SP 1 or other agreed-upon methods. Section A4 of Appendix A provides information about nonvisible contaminants.

5.2 Before beginning cleaning, surface imperfections such as sharp edges or weld spatter shall be removed from the surface to the extent required by the procurement documents (project specification). Section A11 of Appendix A provides additional information.

6. Abrasive Blast Cleaning Methods and Operation

6.1 Any of the following methods of surface preparation can be used to achieve a thorough abrasive blast-cleaned

⁽²⁾ NACE International, 15835 Park n Place, Houston, TX 77084-5145 Phone +1 (281) 28-6200 Standards available from <<https://www.nace.org>>

⁽³⁾ General Services Administration, <http://quicksearch.dla.mil/qssearch.aspx>

non-ferrous metal or stainless-steel surface. Hazardous materials may be present. Section A12 of Appendix A provides additional information regarding hazardous materials.

6.1.1 Dry abrasive blast cleaning using compressed air, blast nozzles, and abrasive.

6.1.2 Dry abrasive blast cleaning using a closed-cycle, recirculating abrasive system with compressed air, blast nozzle, and abrasive, with or without vacuum for dust and abrasive recovery.

6.1.3 Dry abrasive blast cleaning using a closed-cycle, recirculating abrasive system with centrifugal wheels and abrasive.

6.2 Clean, dry compressed air shall be used for nozzle blasting. Cleanliness of the compressed air shall be verified in accordance with the procedure described in ASTM D4285. Moisture separators, oil separators, traps, or other equipment may be necessary to achieve this requirement.

6.3 Wet abrasive blast cleaning methods may be used to achieve a thorough abrasive blast cleaned non-ferrous metal or stainless-steel surface if specified in the contract documents. Information on the use of inhibitors to prevent the formation of corrosion immediately after wet abrasive blast cleaning is in Section A13 of Appendix A.

6.4 Additional considerations when performing thorough abrasive blast cleaning of non-ferrous metals or stainless steels should be considered and are found in Section A1 through Section A3 of Appendix A.

7. Blast Cleaning Abrasives

7.1 Selection of abrasive size and type shall be based on the type, grade, thickness, and surface condition of the non-ferrous metal or stainless steel to be cleaned, the type of blast cleaning system used, the finished surface to be produced (cleanliness and surface profile [roughness]), and whether the abrasive will be recycled.

7.2 Mineral and slag abrasive shall be dry and free of oil, grease, and other contaminants as determined by the test methods found in SSPC-AB 1 or as required by the procurement documents (project specification). The cleanliness and size of the work mix for recycled non-metallic abrasives shall be maintained to ensure compliance with Section 4.4 (Quality Control Tests for Recycled Work Mix) of SSPC AB-1.

7.3 Aluminum oxide shall comply with A-A-59316 Type I, Grade A, or SSPC-AB 1.

7.4 New stainless-steel blast cleaning abrasives shall meet the SSPC-AB 1 requirements for Water Soluble Contaminants (Section 4.1.4), Moisture Content

(Section 4.1.5), and Oil Content (Section 4.1.6) unless otherwise required by the procurement documents (project specification). The cleanliness and size of the work mix for recycled stainless-steel abrasive shall comply with all requirements of SSPC-AB 2 Section 4. See Appendix A 14 for additional information on use of other ferrous media.

7.5 If encapsulated abrasive is used, cleanliness and size shall meet the requirements of Section 6 of SSPC-AB 4.

7.6 The abrasive shall comply with any additional specified requirements or limitations. Additional information on abrasive selection for thorough abrasive blast cleaning of non-ferrous metals and stainless steels is found in Section A15 of Appendix A.

7.7 After cleaning, the surface profile of the cleaned metal, when measured in accordance with SSPC-PA 17, shall conform to the requirements specified in the procurement documents (project specification). If the surface profile is not specified in the procurement documents, the abrasive selected shall roughen the cleaned surface to the degree required by the product data sheet for the coating to be applied. Additional information on surface profile and the film thickness of coating applied over the surface profile is in Sections A16 and A17 of Appendix A.

8. Procedures Following Blast Cleaning and Immediately Prior to Coating

8.1 Visible deposits of oil, grease, and other soluble contaminants shall be removed by methods in accordance with SSPC-SP 1 or as specified.

8.1.1 Note that some cleaning methods specified in SSPC-SP 1 may not be compatible with all metals. See Sections A1 through A3 of Appendix A for additional information on specific materials.

8.2 Dust and loose residues shall be removed from blast cleaned surfaces by brushing; blowing off with clean, dry air; vacuum cleaning; or other specified methods.

8.2.1 Cleanliness of the compressed air must be verified in accordance with the procedure described in ASTM D4285.

8.3 After blast cleaning, any surface imperfections (e.g., sharp edges, weld spatter) shall be removed or resolved to the extent required in the procurement documents (project specification). Any damage to the surface profile resulting from the removal or resolution of surface imperfections shall be corrected to meet the requirements of Section 7.7. After removal of surface imperfections, the surface shall be blast cleaned again to meet the profile requirements of the procurement documents (project specification). Additional information on surface imperfections is provided in Section A11 of Appendix A.