

SSPC: The Society for Protective Coatings

SURFACE PREPARATION SPECIFICATION

SSPC-SP 16

Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals

Foreword

This standard covers surface preparation of coated or uncoated metal surfaces other than carbon steel prior to the application of a protective coating system. Surface preparation using this standard is used to uniformly roughen and clean the bare substrate and to roughen the surface of intact coatings on these metals prior to coating application. Substrates that may be prepared by this method include, but are not limited to, galvanized surfaces, stainless steel, copper, aluminum, and brass. For the purpose of this standard, the zinc metal layer of hot-dip galvanized steel is considered to be the substrate, rather than the underlying steel. This standard is not to be used for cleaning coated or uncoated carbon steel substrates. Five different standards are available for cleaning carbon steel: White Metal Blast Cleaning¹, Near-White Metal Blast Cleaning², Commercial Blast Cleaning³, Industrial Blast Cleaning⁴, and Brush-Off Blast Cleaning⁵. This standard is intended for use by coating specifiers, applicators, inspectors, or others who may be responsible for defining a standard degree of surface cleanliness.

This standard represents a degree of cleaning that is similar to that defined for carbon steel substrates in SSPC-SP7/NACE No. 4 except that a minimum surface profile depth on the bare metal surface is required.

1. Scope

1.1 This standard covers the requirements for brush-off blast cleaning of uncoated or coated metal surfaces other than carbon steel by the use of abrasives. These requirements include visual verification of the end condition of the surface and materials and procedures necessary to achieve and verify the end condition.

1.2 Information about the function of brush-off blast cleaning as defined in SP 16 is in Paragraph A1 of Appendix A.

2. Definitions

2.1 A brush-off blast cleaned non-ferrous metal surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, metal oxides (corrosion products), and other foreign matter. Intact, tightly adherent coating is permitted to remain. A coating is considered tightly adherent if it cannot be removed by lifting with a dull putty knife. Bare metal substrates shall have a minimum profile of 19 micrometers (0.75 mil).

2.1.1 The entire surface shall be subjected to the abrasive blast to achieve the specified degree of cleaning and to produce a dense and uniform surface profile on the bare metal substrate. The peaks and valleys on the surface shall form a continuous pattern, leaving no smooth, unprofiled areas. Tightly adherent coating is permitted to remain. A coating is considered tightly adherent if it cannot be removed by lifting with a dull putty knife.

2.1.2 Intact coatings that are present shall be roughened and cleaned as specified in the procurement documents. 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.

2.1.3 Immediately prior to coating application, the entire surface shall comply with the degree of cleaning as specified herein.

3. Associated Documents

3.1 Documents cited in the mandatory sections of this standard include:

Document	Title
SSPC-SP 1 ⁶	Solvent Cleaning
ASTM D 4285 ^{(1),7}	Standard Test Method for Indicating Oil or Water in Compressed Air

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

ASTM D 4417^{(2),8}	Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel
ASTM D 7127⁹	Standard Test Method for Measurement of Surface Roughness of Abrasive Blast Cleaned Metal Surfaces Using a Portable Stylus Instrument
ASTM D 7393¹⁰	Method for Indicating Oil in Abrasives

3.2 The latest issue, revision, or amendment of the documents listed in Paragraph 3.1 in effect on the date of invitation to bid shall govern unless otherwise specified.

3.3 If there is a conflict between the requirements of any of the documents listed in Paragraph 3.1 and this standard, the requirements of this standard shall prevail.

4. Procedures Before Brush-Off Blast Cleaning of Non-Ferrous Metal Surfaces

4.1 Before blast cleaning of non-ferrous metal surfaces, visible deposits of oil, grease, or other contaminants that would interfere with coating adhesion shall be removed in accordance with SSPC-SP 1 or other specified methods.

4.2 Surface imperfections shall be corrected to the extent specified in the procurement documents (project specifications). Additional information on surface imperfections is in Paragraph A2 of Appendix A.

4.3 Unique Requirements for Preparation of Galvanized Steel

4.3.1 Before blast cleaning, galvanized surfaces shall be checked for the presence of "wet storage stain." Blast cleaning shall not be used to remove wet storage stain. The "dwell time" necessary for the blast stream to remove wet storage stain can damage the galvanized surface. Additional information on the removal of wet storage stain is in Paragraph A3 of Appendix A. Additional information on blast cleaning galvanized steel is in Appendix A9.

4.3.2 Unless written documentation exists to confirm that a galvanized surface is known to be free of chromates or other passivating treatments, representative areas of galvanized surfaces that will be coated shall be tested as described in Section 4.3.3 for the presence of chromates or other passivating treatments before brush-off blast cleaning is performed. If chromates or other passivating treatments are detected, the surface shall be retested after blast cleaning to confirm complete removal. OSHA requirements for worker protection from toxic metals may apply. Additional information on heavy metal toxicity is in Paragraph A4 of Appendix A.

4.3.3 Test for Presence of Passivating Treatments on Galvanizing (e.g., Chromating): "Chromating" refers to the treatment of galvanized parts to prevent the occurrence of wet storage stain. Most sheet metal and coil stock used to fabricate decking and curtain wall receives chromating treatments. The presence of chromates or other passivating treatments is detected by using a solution of copper sulfate, with the following procedure:

1. Ensure that surfaces are free of any visible oxidation or oxidation by-products
2. Prepare the solution by dissolving 2 grams of copper sulfate crystals in 100 ml of deionized water.
3. Mark off three adjacent areas on the galvanized part, approximately 6.45 cm² (1 inch²)
4. Leave one area untouched, solvent wash the second and third areas, and also thoroughly sand the third area using emery paper.
5. Using an eyedropper or pipette, saturate a cotton swab with the copper sulfate solution and apply to all three areas, or apply the solution directly to the three areas.

If all three areas turn black immediately, there is no passivation on the surface. If the first area does not turn black within 10 seconds and the second and third areas turn black immediately, there is no passivation on the surface with the possible exception of light oil. If the first and second areas do not turn black within 10 seconds and the third area turns immediately, a passivator of some type is present.

5. Blast Cleaning Methods and Operation

5.1 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 D 4285. Moisture separators, oil separators, traps, or other equipment may be necessary to achieve this requirement.

5.2 Any of the following methods of surface preparation may be used to brush-off blast clean a non-ferrous metal substrate, but the presence of toxic metals in the abrasives or coating being removed can place restrictions on the methods of cleaning permitted. The chosen method shall comply with all applicable regulations.

5.2.1 Dry abrasive blasting using compressed air, blast nozzles, and abrasive.

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

5.2.3 Dry abrasive blasting using a closed-cycle, recirculating abrasive system with centrifugal wheels and abrasive.

⁽²⁾ Although ASTM D 4417 is written for blast-cleaned steel, the methods are suitable for use on non-ferrous metals.