



SSPC: The Society for Protective Coatings/NACE International

Joint SSPC Surface Preparation Standard/ NACE Standard Practice

SSPC-SP 5 (WAB)/NACE WAB-1 White Metal Wet Abrasive Blast Cleaning

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FOREWORD

This SSPC/NACE joint standard defines the process for preparing a carbon steel surface to the White Metal degree of surface cleanliness using a wet abrasive blast (WAB) method of cleaning. This standard is intended for use by coating or lining specifiers, applicators, inspectors, or others whose responsibility is to define a standard degree of surface cleanliness for carbon steel surfaces to be achieved by wet abrasive blast cleaning.

WAB cleaning is a process using a mixture of water and abrasive that can produce various levels of surface cleanliness and surface profile (roughness) similar to those obtained with dry abrasive blast (DAB) cleaning. WAB cleaning may be specified when dust suppression is desired, and may also

be a means for reducing soluble salt contamination. The WAB cleanliness level specified should be the same as the corresponding degree of cleaning specified if DAB cleaning were the process being used.

The focus of this standard is White Metal WAB cleaning. The five degrees of WAB cleaning are as follows:

Degree of Surface Cleanliness	Designation
White Metal WAB	SSPC-SP 5 (WAB)/ NACE WAB-1
Near-White Metal WAB	SSPC-SP 10 (WAB)/ NACE WAB-2 ¹
Commercial WAB	SSPC-SP 6 (WAB)/ NACE WAB-3 ²
Industrial WAB	SSPC-SP 14 (WAB)/ NACE WAB-8 ³
Brush-Off WAB	SSPC-SP 7 (WAB)/ NACE WAB-4 ⁴

White metal WAB cleaning provides a greater degree of cleaning than near-white metal WAB cleaning [SSPC-SP 10 (WAB)/NACE WAB-2 (WAB)].

White metal WAB cleaning is used when the objective is to remove all rust and other corrosion products, coating, mill scale, and other foreign matter from the surface. White metal WAB cleaning does not permit any staining to remain on the surface. Near-White Metal WAB cleaning allows staining on no more than 5% of each unit area of surface.

This standard references the three levels of flash rust as defined in the SSPC/NACE joint standards for waterjetting (see Paragraph 3.1 in this standard).⁵⁻⁸ Additional information regarding flash rust is provided in nonmandatory Appendixes A, B, and C.

Steel surfaces prepared by WAB cleaning can develop flash rust within minutes after the cleaning is completed. The project specification often contains requirements for the permissible level of flash rust before coating application. Additional information is provided in Paragraph A1 in Appendix A and in Appendix C.

This standard was prepared in 2015 by SSPC/NACE Joint Task Group (TG) 350B "White Metal Surface Preparation by Wet Abrasive Blast Cleaning." TG 350B is administered by SSPC C.2 Surface Preparation Group Committee and NACE Specific Technology Group (STG) 04, "Coatings and Linings, Protective: Surface Preparation." This joint standard is issued by SSPC/NACE under the auspices of SSPC C.2 and NACE STG 04. This standard is one of a set of five standards on the degrees of surface cleanliness to be achieved by WAB cleaning.

In SSPC/NACE standards, the terms *shall*, *must*, *should*, and *may* are used in accordance with the definitions of these terms in the *SSPC/NACE Joint Publications Style Manual*, Paragraph 2.2.1.8. *Shall* and *must* are used to state mandatory requirements. The term *should* is used to state something considered good and is recommended but is not mandatory. The term *may* is used to state something considered optional.

1. GENERAL

1.1 A wet abrasive blast-cleaned (WAB) surface is one prepared by combining water and abrasive in a blast cleaning operation by one of several methods, including 1) injection of water into the abrasive stream either internally or externally as the abrasive stream exits the blast nozzle; 2) injection of abrasive into pressurized water; or 3) use of an abrasive slurry under pressure to achieve the specified WAB degree of cleanliness.

1.2 This standard defines the White Metal Wet Abrasive Blast Cleaning (SSPC-SP 5 [WAB]/NACE WAB-1) degree of visible surface cleanliness of uncoated or coated steel surfaces achieved by the use of wet abrasive blast cleaning. The requirements include the end condition of the surface as determined by visual inspection, and materials and procedures used to achieve and verify the end condition.

1.3 This standard is limited to requirements for visible surface contaminants. Additional information on nonvisible contamination is found in Paragraph A2 of Appendix A. Additional information on soluble salt testing is provided in SSPC-Guide 15.⁹

1.4 Information about the function of WAB cleaning is provided in Paragraph A3 of Appendix A.

1.5 Information about use of this standard in maintenance coating work is provided in Paragraph A4 of Appendix A.

2. DEFINITION

2.1 WHITE METAL WAB SURFACE: A white metal WAB 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.

3. ADDITIONAL TECHNICAL CONSIDERATIONS

3.1 FLASH RUST: Flash rust is an oxidation product that forms as a wetted carbon steel substrate dries. Flash rust is an additional consideration when a carbon steel substrate is subjected to WAB cleaning. Additional information is provided in Section 8. Degrees of flash rust may be qualitatively described as follows:

3.1.1 No flash rust: A carbon steel surface that, when viewed without magnification, exhibits no visible flash rust.

3.1.2 Light (L) flash rusted surface: A carbon steel surface that, when viewed without magnification, exhibits small quantities of a rust layer through which the carbon steel substrate may be observed. The rust or discoloration may be evenly distributed or present in patches, but it is tightly adherent and not easily removed by lightly wiping with a cloth. (Table C1 in Appendix C provides flash rust evaluation criteria if the tape pull test is specified for assessing the degree of flash rust.)

3.1.3 Moderate (M) flash rusted surface: A carbon steel surface that, when viewed without magnification, exhibits a layer of rust that obscures the original carbon steel surface. The rust layer may be evenly distributed or present in patches, but it is reasonably well adherent and leaves light marks on a cloth that is lightly wiped over the surface. (Table C1 in Appendix C provides flash rust evaluation criteria if the tape pull test is specified for assessing the degree of flash rust.)

3.1.4 Heavy (H) flash rusted surface: A carbon steel surface that, when viewed without magnification, exhibits a layer of heavy rust that hides the original carbon steel surface completely. The rust may be evenly distributed or present in patches, but it is loosely adherent, easily comes off, and leaves significant marks on a cloth that is lightly wiped over the surface. (Table C1 in Appendix C provides flash rust evaluation criteria if the tape pull test is specified for assessing the degree of flash rust.)

3.1.5 Additional information is provided in Paragraphs A3, A5, A6, and A7 of Appendix A. Additional information on methods of assessing the degree of flash rust is provided in Appendix C.

3.1.6 NOTE: When performing the wipe test mentioned in Paragraphs 3.1.2, 3.1.3, and 3.1.4 and described in Paragraph C2 of Appendix C, the angular profile that results from surface preparation using WAB cleaning can pull lint from a cloth. The pressure sensitive tape pull test, which is an alternate technique for determining the level of flash rust that does not involve cloth and will not deposit lint on a WAB-cleaned surface, is described in Appendix C.

3.2 APPEARANCE VARIATIONS

3.2.1 Acceptable variations in appearance that do not affect the degree of surface cleanliness defined in Paragraph 2.1 include variations caused by composition of the metallic substrate, original surface condition, thickness of the metal, weld metal, mill or fabrication marks, heat treating, heat-affected zones, and differences resulting from the abrasive blast pattern.

3.2.2 The visual appearance of WAB-cleaned surfaces is not necessarily the same as the visual appearance of DAB cleaned surfaces. Visual guides or reference photographs, such as SSPC-VIS 1, prepared as a guide to the amount of material or staining allowed to remain on the cleaned surface for the various degrees of DAB cleaning, do not depict the appearance of the flash rust that often occurs with WAB cleaning.¹⁰ Visual guides or reference photographs prepared for DAB cleaned surfaces must not be used as inspection or judgment criteria for WAB-cleaned surfaces. Direct correlation to existing dry abrasive blasting standards and visual comparators may be inaccurate, inappropriate, or both.

3.3 SSPC-VIS 5/NACE VIS-9 or other visual guide or comparator may be specified to supplement the written

definition.¹¹ In any dispute, the written standard shall take precedence over the visual guide or comparator. Additional information is provided in Paragraph A6 of Appendix A and in Appendix B.

4. ASSOCIATED DOCUMENTS

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

Document	Title
SSPC-AB 1 ¹²	Mineral and Slag Abrasives
SSPC-SP 1 ¹³	Solvent Cleaning
ASTM ⁽¹⁾ D4285 ¹⁴	Method for Indicating the Presence of Oil or Water in Compressed Air

4.2 The latest issue, revision, or amendment of the documents listed in Paragraph 4.1 in effect on the date of invitation to bid shall govern unless otherwise specified.

4.3 If there is a conflict between the requirements of any of the documents listed in Paragraph 4.1 and this standard, the requirements of this standard shall prevail.

5. PROCEDURES BEFORE WET ABRASIVE BLAST CLEANING

5.1 PRECLEANING: Visible deposits of oil, grease, or other contaminants shall be removed in accordance with SSPC-SP 1 or as specified. Additional information about nonvisible contaminants is provided in Paragraph A2 of Appendix A.

5.2 Before beginning WAB cleaning, surface imperfections such as sharp edges, weld spatter, or burning slag shall be removed from the surface to the extent required by the procurement documents (project specification). Additional information is provided in Paragraph A8 of Appendix A.

5.3 If a visual guide or reference photographs are specified to supplement the written standard, the condition of the steel before WAB cleaning should be determined before the WAB cleaning commences. Additional information about reference photographs and comparators is provided in Paragraph A6 of Appendix A.

6. WET ABRASIVE BLAST CLEANING METHODS

6.1 Any of the following WAB cleaning methods can be used to achieve the SSPC-SP 5 (WAB)/NACE WAB-1, White Metal degree of cleanliness. SSPC-TR 2/NACE Publication 6G198¹⁵ provides detail about WAB cleaning equipment, nozzles, flow rates, and operating pressures. Hazardous materials may be present. Additional information is provided in Paragraph A9 of Appendix A.

(1) ASTM International (ASTM) 100 Barr Harbor Dr., West

6.1.1 Pressurized-air systems that use conventional dry abrasive blasting equipment and add water. Oil-free compressed air shall be used for WAB systems. Cleanliness of the compressed air shall be verified in accordance with the procedure described in ASTM D4285.

6.1.2 Systems that use conventional waterjetting equipment and add abrasive.

6.1.3 Pressurized water abrasive blasting (slurry blasting) systems that accelerate a water/abrasive mixture.

7. WET ABRASIVE BLAST CLEANING MATERIALS

7.1 During selection of the abrasive, the size and type shall be based on the type, grade, and surface condition of the steel to be cleaned, the type of blast cleaning system used, the finished surface to be produced, and cleanliness and surface profile (roughness).

7.2 The WAB cleaning abrasive shall be free of oil, grease, and other contaminants as determined by the test methods in SSPC-AB 1, or as required by the procurement documents (project specification).

7.3 The abrasive must comply with any additional specified requirements or limitations. Additional information on abrasive selection is provided in Paragraph A10 of Appendix A

7.4 When a coating is specified, the selected abrasive shall roughen the cleaned surface to produce the surface profile specified in the procurement documents (project specification). If the surface profile is not specified in the procurement documents (project specification), the selected abrasive 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 the coating applied over the surface profile is provided in Paragraphs A11 and A12 of Appendix A.

7.5 SURFACE PREPARATION WATER (SP WATER):
Water of sufficient purity and quality that it does not prevent the surface being cleaned from achieving the specified degree of surface cleanliness or nonvisible contaminant criteria if contained in the procurement documents (project specification). SP water should not contain sediments or other impurities that are destructive to the proper functioning of the cleaning equipment. Additional information is provided in Paragraph A13 of Appendix A.

8. PROCEDURES FOLLOWING WET ABRASIVE BLAST CLEANING AND IMMEDIATELY BEFORE COATING

8.1 Visible deposits of oil, grease, or other contaminants shall be removed in accordance with SSPC-SP 1 or as specified. Additional information is provided in Paragraphs A1, A2.6, and A2.7 of Appendix A.

8.2 Immediately before coating application, the entire surface to be coated shall comply with the degree of cleanliness defined by this standard and the level of flash rust specified in the procurement documents (project specification). Information on rust-back (re-rusting) and the effect of dew point (surface condensation) is provided in Paragraphs A15 and A16 of Appendix A.

8.3 Flash rust shall be mitigated in accordance with the requirements of the procurement documents (project specification). An example of a specification statement is provided in Paragraph A5.1 of Appendix A. It is common practice to remove heavy flash rust by low-pressure water cleaning (LP WC), high-pressure water cleaning (HP WC), or dry abrasive sweep blasting.

8.4 Wetted abrasives stick to the surface and lengthen the time of drying. The key to the amount of flash rust that forms on a surface is the length of time the surface remains wet and the quality of the water being used. The wet abrasive should be physically removed as soon after blast cleaning as feasible, before the surface and abrasive have dried. Wet abrasive is typically removed by pressure washing.

8.5 Dust and loose residues shall be removed from cleaned surfaces by brushing; blowing off with clean, dry compressed air; vacuum cleaning; or other specified methods. Additional information is provided in Paragraph A14 of Appendix A. Moisture separators, oil separators, traps, or other equipment may be necessary to achieve this requirement. Cleanliness of the compressed air must be verified in accordance with the procedure described in ASTM D4285.

8.6 If dust and loose residues are removed by wet methods, drying the surface as quickly as possible after removal may be necessary to meet the level of flash rust found in the requirements of the procurement documents (project specification.) Additional information is provided in Paragraph B2 of Appendix B.

8.7 After WAB cleaning, any remaining surface imperfections (e.g., sharp edges, weld spatter, burning slag, scabs, slivers) shall be removed to the extent required in the procurement documents (project specification). After removal of surface imperfections, the surface shall be reprofiled to meet the requirements of the procurement documents (project specification). Additional information on surface imperfections is provided in Paragraph A8 of Appendix A.

9. REFERENCES

1. SSPC-SP 10 (WAB)/NACE WAB-2 (latest revision), "Near-White Metal Wet Abrasive Blast Cleaning" (Pittsburgh, PA: SSPC and Houston, TX: NACE).
2. SSPC-SP 6 (WAB)/NACE WAB-3 (latest revision), "Commercial Wet Abrasive Blast Cleaning" (Pittsburgh, PA: SSPC and Houston, TX: NACE).