Item 21158

Joint Surface Preparation Standard

Waterjet Cleaning of Metals—Clean to Bare Substrate (WJ-1)

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Foreword

This NACE/SSPC joint standard defines the Clean to Bare Substrate (WJ-1) degree of surface cleanliness of coated or uncoated metallic substrates achieved by the use of waterjet cleaning prior to the application of a protective coating or lining. Waterjet cleaning is the use of pressurized surface preparation water for removing coatings and other materials, including hazardous materials, from a substrate to achieve a defined degree of surface cleanliness. Waterjet cleaning includes various methods such as low-pressure water cleaning (LP WC), high-pressure water cleaning (HP WC), high-pressure waterjetting (HP WJ), and ultrahigh-pressure waterjetting (UHP WJ).

The four degrees of surface cleanliness achieved by waterjet cleaning, which are addressed in separate standards, are as follows:

Degree of Surface Cleanliness	Designation
Clean to Bare Substrate	WJ-1
Very Thorough Cleaning	WJ-2
Thorough Cleaning	WJ-3
Light Cleaning	WJ-4

Clean to Bare Substrate (WJ-1) provides a greater degree of surface cleanliness than Very Thorough Cleaning (WJ-2).

Waterjet cleaning to achieve the Clean to Bare Substrate (WJ-1) degree of surface cleanliness is used when the objective is to remove every trace of rust and other corrosion products, coating, and mill scale. Discoloration of the surface may be present.

Waterjet cleaning does not provide the primary anchor pattern on the metallic substrate known as “surface profile.” The coatings industry uses waterjet cleaning primarily for recoating or relining projects in which there is an adequate pre-existing surface profile. The degrees of surface cleanliness cited above to be achieved by waterjet cleaning methods are not intended to require that a surface profile be present or defined prior to coating application.

Waterjet cleaning reduces and may completely remove water-soluble surface contaminants, notably those contaminants found at the bottom of pits on the surface of corroded metallic substrates. Waterjet cleaning also helps remove oil, grease, rust and other corrosion products, and other foreign matter (for example, shotcrete spatter) from the surface, and is used when it is a more feasible method of surface preparation than, for example, abrasive blast cleaning, power or hand tool cleaning, or chemical stripping. Waterjet cleaning may be used when the application of high-performance coatings requires extensive surface preparation, surface decontamination, or both.

This standard is intended for use by coating or lining specifiers, applicators, inspectors, or others who have responsibility to define a standard degree of surface cleanliness to be achieved by waterjet cleaning methods.

This standard was prepared by NACE/SSPC Joint Task Group (TG) 275, “Surface Preparation of Metals to WJ-1 (Clean to Bare Substrate) by High-Pressure Waterjetting.” TG 275 is administered by Specific Technology Group (STG) 04, “Coatings and Linings, Protective—Surface Preparation,” and is sponsored by STG 02, “Coatings and Linings, Protective—Atmospheric,” and STG 03, “Coatings and Linings, Protective—Immersion and Buried Service.” This standard is issued by NACE under the auspices of STG 04, and by SSPC Group Committee C.2 on Surface Preparation. This standard is one of a set of four standards on degrees of surface cleanliness to be achieved by waterjet cleaning that are intended to replace NACE No. 5/SSPC-SP 12,[1] which includes all four degrees of surface cleanliness.

In NACE/SSPC standards, the terms *shall, must, should*, and *may* are used in accordance with Paragraph 2.2.1.8 of the Agreement between NACE International and SSPC: The Society for Protective Coatings. The terms *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.

NACE/SSPC

Joint Surface Preparation Standard

Waterjet Cleaning of Metals—Clean to Bare Substrate (WJ-1)

Contents

Section 1: General

1.1 This standard defines the Clean to Bare Substrate (WJ-1) degree of surface cleanliness of uncoated or coated metallic substrates by use of waterjet cleaning. The defined degree of cleanliness shall be achieved prior to the application of a specified protective coating or lining system. These requirements include the end condition of the surface and materials and procedures necessary to achieve and verify the end condition, as determined by visual inspection. This standard also may be used in situations in which the degree of cleanliness is required, but protective coatings or linings are not immediately applied. (Paragraphs A1 and A2 of Appendix A provide additional information.) Waterjet cleaning does not establish but may reveal an existing surface profile on a metallic substrate. If the existing surface profile is not acceptable for subsequent coating application, alternative surface preparation methods to create the required surface profile must be considered. (Paragraph A3 of Appendix A provides additional information.)

1.1.1 Clean to Bare Substrate (WJ-1) is the waterjet cleaning equivalent to the International Organization for Standardization (ISO)[(1)] 8501-1[2] degree of cleanliness Sa 3, cleaning to bare metal. ISO 8501-4[3] notes the use of various common terms for methods of waterjet cleaning: water jetting, water blast cleaning, hydrojetting, aquajetting, hydroblasting, aquablasting, and "cleaning by directing a jet of pressurized water onto the surface to be cleaned."

1.1.2 Within the hierarchy of degrees of surface cleanliness achieved by waterjet cleaning, Clean to Bare Substrate (WJ-1) is intended to be similar to the degree of surface cleanliness of NACE No. 1/SSPC-SP 5,[4] except that stains are permitted to remain on the surface.

1.2 Although carbon steel is the metallic substrate most frequently cleaned in the field using waterjetting technology, waterjet cleaning may be used on metallic substrates other than carbon steel, including other ferrous substrates such as alloy steels, stainless steels, ductile iron, and cast irons, nonferrous substrates such as aluminum, and copper alloys such as bronze. For convenience, the written definitions of the degrees of surface cleanliness of the metallic substrate use the general term "rust and other corrosion products." The term "rust" is intended to apply to carbon steel substrates and the term "other corrosion products" (such as surface oxides) is intended to apply to metallic substrates other than carbon steel that are being waterjet cleaned. "Flash rust" is an oxidation product that forms as a wetted carbon steel substrate dries. The visual guides and comparators referenced for cleanliness and flash rust only illustrate carbon steel substrates.

1.3 This standard does not address surface preparation of concrete. Information on surface preparation of concrete can be found in NACE No. 6/SSPC-SP 13.[5]

1.4 This standard is limited to requirements for visible surface contaminants. Information on nonvisible contamination can be found in Paragraph A8 of Appendix A.

Section 2: Definitions

2.1 Clean to Bare Substrate (WJ-1): A metal surface after Clean to Bare Substrate, when viewed without magnification, shall have a matte (dull, mottled) finish and shall be free of all visible oil, grease, dirt, rust and other corrosion products, previous coatings, mill scale, and foreign matter.

2.1.1 Thin films of mill scale, rust and other corrosion products, and coating are not allowed. (Paragraphs A4 and A5 provide additional information).

2.1.2 The gray to brown-black discoloration remaining on corroded and pitted carbon steel that cannot be removed by further waterjet cleaning is allowed.

2.1.3 NACE VIS 7/SSPC-VIS 4[6] or other visual guide or comparator may be specified to supplement the written definition. In any dispute, the written standard shall take precedence over the visual guide or comparator. (Paragraph A6 of Appendix A provides additional information.)

[(1)] International Organization for Standardization (ISO), 1 ch. de la Voie-Creuse, Case postale 56, CH-1211 Geneva 20, Switzerland.