SSPC: The Society for Protective Coatings

GUIDE TO SSPC VIS-4/NACE VIS 7

Guide and Reference Photographs for Steel Surfaces Prepared by Waterjetting

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1. Scope

1.1 This Guide describes the use of Reference Photographsdepicting the appearance of unpainted rusted carbon steel and painted carbon steel, with or without rust, prior to and after cleaning by waterjetting (WJ). The Reference Photographs are intended to supplement the written standard SSPC-SP 12/NACE No. 5.[1] Pictures and descriptions of flash rusting are included for illustrative purposes. The written standards are the primary means to determine conformance with cleaning requirements. The photographs should not be used as a substitute for these standards.

2. Description

2.1 The Reference Photographs consist of a series of 1:1 (actual size) color photographs that represent various conditions of unpainted and painted carbon steel surfaces prior to and after waterjet cleaning. (See Section A.1.)

2.1.1 The user of this Guide should designate the degree of cleaning as WJ-1 (Clean to Bare Substrate), WJ-2 (Very Thorough Cleaning), WJ-3 (Thorough Cleaning), or WJ-4 (Light Cleaning) of SSPC-SP 12/NACE No 5. (See Section 4.2.)

2.1.2 This Guide can be used to clarify the acceptable level of flash rusting allowed prior to the application of protective coatings. The coating manufacturer should be contacted to verify that the coating material selected is suitable for application over the maximum allowable degree of flash rusting that has been specified. (See Sections A.3, A.4, A.5, A.6, and A.7.)

2.1.3 The user of this Guide should designate the maximum degree of flash rust permissible as None (the condition immediately after cleaning), Light (L), Moderate (M), or Heavy (H) Flash Rust. (See Section 4.4.)

2.1.4 The two series of flash rust photographs are illustrative of steel substrates cleaned by wet methods specified in WJ-1, WJ-2, WJ-3, or WJ-4 of SSPC-SP 12/NACE No. 5, not just for the conditions illustrated herein. Illustrative photos are included for Conditions C and D but not for Conditions A and B.

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3. Referenced Publications

3.1 SSPC AND NACE INTERNATIONAL REFERENCED PUBLICATIONS:

SSPC-SP 12/NACE No. 5 Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating

SSPC-SP 1[2] Solvent Cleaning

4. Conditions Depicted

4.1 INITIAL CONDITIONS: The Reference Photographs illustrate five of the seven initial conditions[(1)] before surface preparation as follows (see Section A.1):

Condition A (not illustrated): Steel surface completely covered with adherent mill scale; little or no rust visible.

Condition B (not illustrated): Steel surface covered with both mill scale and rust.

Condition C: Steel surface completely covered with rust; little or no pitting visible. The area includes an example of a discoloration caused by heat. (Rust Grade C)

Condition D: Steel surface completely covered with rust; pitting visible. The area includes an example of foreign matter. (Rust Grade D)

Condition E: Previously painted steel surface; light-colored paint applied over blast-cleaned surface; paint mostly intact.

Condition F: Previously painted steel surface; zinc-rich paint applied over blast-cleaned steel; paint mostly intact.

Condition G: Painting system applied over mill scale bearing steel; system thoroughly weathered, thoroughly blistered, or thoroughly stained.

Condition H: Degraded painting system applied over steel; system thoroughly weathered, thoroughly blistered, or thoroughly stained.

4.1.1 Other Conditions: When waterjetting is used to remove paint and other contaminants from mill scale bearing steel (Conditions A, B, and G), the mill scale is not usually removed. In that case, the appearance of the cleaned steel would be very similar to Initial Condition A or B.

4.2 END CONDITION: The various degrees of cleaning, with no flash rust, are described in SSPC-SP 12/NACE No. 5 (see Section A.2) as:

WJ-1	Clean to Bare Substrate
WJ-2	Very Thorough or Substantial Cleaning
WJ-3	Thorough Cleaning
WJ-4	Light Cleaning

4.3 Steel surfaces show variations in texture, shade, color, tone, pitting, flaking, and mill scale, which should be considered when making comparisons with the reference photographs. Acceptable variations in appearance that do not affect surface cleanliness include variations caused by type of steel, original surface condition, thickness of the steel, weld metal, mill fabrication marks, heat treating, heat affected zones, and differences caused by the initial abrasive blast cleaning technique or by the cleaning pattern. (See Sections A.1 and A.8.)

4.4 FLASH RUST: The Reference Photographs also illustrate three degrees of flash rust. Flash rust or rust bloom is a light oxidation of the steel, which occurs as waterjet-cleaned steel dries off. It quickly changes the appearance. The color of the flash rust may vary depending on the age and composition of the steel and the time-of-wetness of the substrate prior to drying. (See Sections A.3, A.4, and A.5.)

Four series of photographs depict previously painted steel cleaned by waterjetting to produce WJ-1, WJ-2, WJ-3, and WJ-4 of SSPC-SP 12/NACE No. 5. Four initial conditions for paint applied over blast cleaned steel (Conditions E, F, G, and H, defined in Section 4.1) are depicted at each level of visible cleanliness.

4.4.1 No Flash Rust: A surface which, when viewed without magnification, exhibits no visible flash rust.

4.4.2 Light Flash Rust (L): A surface which, when viewed without magnification, exhibits small quantities of a yellow/brown rust layer through which the 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 light wiping with a cloth.

4.4.3 Moderate Flash Rust (M): A surface which, when viewed without magnification, exhibits a layer of yellow/brown rust that obscures the original steel surface. The rust layer may be evenly distributed or present in patches, but it is reasonably well adherent and lightly marks a cloth that is lightly wiped over the surface.

(1) Initial Conditions A, B, C and D are sometimes referred to as Rust Grades A, B, C, and D, respectively.

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