



# Surface Preparation Pictorial Standards for Painting Steel Surfaces



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## Foreword

The effective life of a coating of anti-corrosive paint applied to a steel surface is to a very large extent dependent on how thoroughly the surface has been prepared prior to painting. It is also important to be able to specify clearly the quality of preparation required in each particular case.

Accordingly, a Standard has been approved, specifying four grades of rusting and corresponding preparation grades, each establishing a quality grade or preparation prior to protective painting required on a steel surface in a standard rust grade. These grades are presented in this Standard as a series of prints, which provide a clearer and more rapidly appreciated definition than a verbal description.

The standard has been prepared by the Swedish Corrosion Institute in cooperation with the American Society for Testing and Materials, ASTM, and Steel Structures Painting Council, SSPC, USA. In the specifications relating to preparation of surfaces prior to painting, the SSPC and SIS designations correspond as follows:

<b>SSPC-Vis 1</b>	<b>SIS 05 59 00</b>
SSPC-SP5	A Sa 3, B Sa 3, C Sa 3 and D Sa 3
SSPC-SP10	A Sa 2½, B Sa 2½, C Sa 2½ and D Sa 2½
SSPC-SP6	B Sa2, C Sa 2 and D Sa 2
SSPC-SP7	B Sa1, C Sa 1 and D Sa 1

Descriptions of the SSPC standards can be found on Pages 22-23.



## Scope

This standard refers to surfaces of hot-rolled steel in four different rust grades (A, B, C and D) the same surfaces prepared to two grades of surface quality (St 2 and St 3) by manual scraping and wire-brushing - machine brushing - grinding-etc.

The same surfaces prepared to four grades of surface quality (Sa 1, Sa 2, Sa 2½ and Sa 3) by blasting with various abrasives.

Examples: A steel originally corresponding to rust grade B, which has been scraped or brushed to preparation grade 2 is designated B St 2.

A steel surface originally corresponding to rust grade B, which has been prepared by blast cleaning to preparation grade 2½ is designated B Sa 2½.

The standardized rust and preparation grades are defined by colour prints representing full scale view of a part of a surface.



## Rust grades

- A Steel surface covered completely with adherent mill scale and with little if any rust.
- B Steel surface which has begun to rust and from which the mill scale has begun to flake.
- C Steel surface on which the mill scale has rusted away or from which it can be scraped, but with little pitting visible to the naked eye.
- D Steel surface on which the mill scale has rusted away and on which considerable pitting is visible to the naked eye.



## Preparation grades. Scraping and wire-brushing

It is assumed that prior to treatment the steel surface has been cleaned of dirt and grease, and that the heavier layers of rust have been removed by chipping.

St 2 Thorough scraping and wire-brushing - machine brushing - grinding - etc. The treatment shall remove loose mill scale, rust and foreign matter. Finally, the surface is cleaned with a vacuum cleaner, clean dry compressed air or a clean brush. It should have a faint metallic sheen. The appearance shall correspond to the prints designated St 2.

St 3 Very thorough scraping and wire-brushing - machine brushing - grinding - etc. Surface preparation as for St 2, but much more thoroughly. After removal of dust, the surface shall have a pronounced metallic sheen and correspond to the prints designated St 3.



## Preparation grades. Blast cleaning

It is assumed that prior to treatment the steel surface has been cleaned of dirt and grease, and that the heavier layers of rust have been removed by chipping.

- Sa 1 Light blast cleaning. Loose mill scale, rust and foreign matter shall be removed. The appearance shall correspond to the prints designated Sa 1.
- Sa 2 Thorough blast cleaning. Almost all mill scale, rust and foreign matter shall be removed. Finally, the surface is cleaned with a vacuum cleaner, clean dry compressed air or a clean brush. It shall be greyish in colour and correspond in appearance to the prints designated Sa 2.
- Sa 2½ Very thorough blast cleaning. Mill scale, rust and foreign matter shall be removed to the extent that the only traces remaining are slight stains in the forms of spots or stripes. Finally, the surface is cleaned with a vacuum cleaner, clean dry compressed air or a clean brush. It shall correspond in appearance to the prints designated Sa 2½.
- Sa 3 Blast cleaning to pure metal. Mill scale, rust and foreign matter shall be removed completely. Finally, the surface is cleaned with a vacuum cleaner, clean dry compressed air or a clean brush. It shall then have a uniform metallic colour and correspond in appearance to the prints designated in Sa 3.



Rust Grade  
A



Rust Grade  
B







Rust Grade  
C



Rust Grade  
D





Reparation Grades.  
Scraping and Wire-  
brushing B St 2



Preparation  
Grades. Scraping  
and wire-brushing  
B St 3





Preparation  
Grades. Scraping  
and wire-brushing  
C St 2



Preparation  
Grades. Scraping  
and wire-brushing  
C St 3





Preparation  
Grades. Scraping  
and wire-brushing  
D St 2



Preparation  
Grades. Scraping  
and wire-brushing  
D St 3





Preparation grades.  
Blast cleaning  
A Sa 2½



Preparation grades.  
Blast cleaning  
A Sa 3





Preparation grades.  
Blast cleaning  
B Sa 1



Preparation grades.  
Blast cleaning  
B Sa 2





Preparation grades.  
Blast cleaning  
B Sa 2½



Preparation grades.  
Blast cleaning  
B Sa 3





Preparation grades.  
Blast cleaning  
C Sa 1



Preparation grades.  
Blast cleaning  
C Sa 2



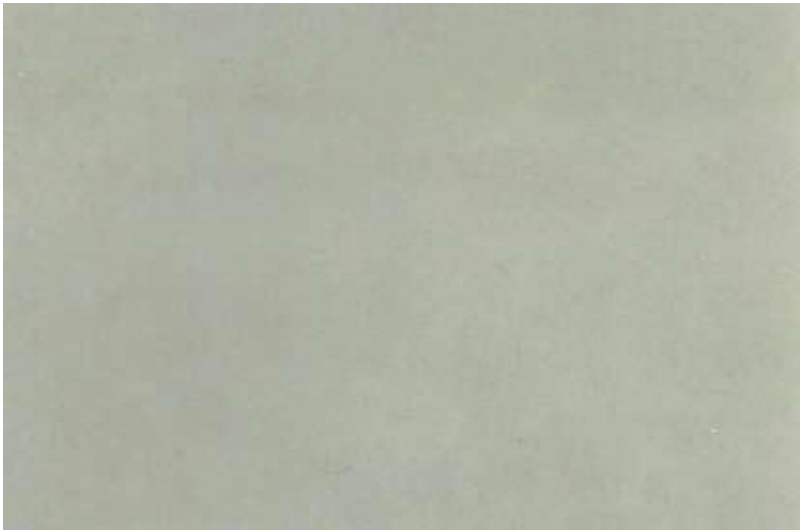




Preparation grades.  
Blast cleaning  
C Sa 2½



Preparation grades.  
Blast cleaning  
C Sa 3





Preparation grades.  
Blast cleaning  
D Sa 1



Preparation grades.  
Blast cleaning  
D Sa 2





Preparation grades.  
Blast cleaning  
D Sa 2½



Preparation grades.  
Blast cleaning  
D Sa 3





## **Steel Surface Preparation and Product**

### **Application Advantages of Blast Cleaning**

It has been indicated by The British Iron & Steel Research Association that surface coating applied to blast cleaned substrates may be expected to last five times as long as the same surface that had been weathered, then manually wire brushed.

The preparation of steelwork obviously has a bearing on the success or failure of any surface coating, and therefore the following information is relevant to steelwork prepared to Swedish Standard SIS 05 59 00 – Sa 2.5.

British Standard BS 7079: Part A1: 1989 (ISO 8501 – 1:1988) – Surface Finish of Blast Cleaned Steel for Painting and Steel Structures Painting Council of America also set out standards for cleanliness.

### **Amplitude – Surface Profile**

Amplitude is a measurement (given in microns), that shows the difference between the peaks and troughs in a metal surface produced by blast cleaning. There must be adequate amplitude on the surface of the substrate to ensure good adhesion. However, if the amplitude on the surface is too rough, then there is a risk that the peaks of the blast cleaning process will protrude through the paint film, leading to significantly higher paint consumption or ‘peak rushing’ or spot rusting.

On average, a surface that has been grit blasted should have a profile that lies between 50 to 70 microns and shot blasted steel under blast primers should be 30 to 50 microns. Profiles exceeding 100 microns should be avoided.

### **Degreasing**

Any surface that is to be blast cleaned and subsequently painted must be thoroughly degreased and cleaned beforehand. This should be done using products in the KPI’s Pre-Clean Range.

Degreasers must be used in conjunction with an absorbent cloth which must be changed frequently to avoid re-depositing oil / grease onto the substrate.



When degreasing, it is necessary to wear adequate personal protection equipment. Refer to Material Safety Datasheets for further information.

## **Re-Preparation**

If a surface coating is damaged during the manufacturing process, in transit or when being handled, it will be necessary to repair the damaged area. If it is at all possible, the original surface treatments should be used in the repair process, to the original specification.

## **Shop Applications**

Surface coatings that are damaged which are being rectified in shop must be blast cleaned to original standard. Particular attention should be paid to weld areas where spatter, slag, etc and heat damaged coatings should be removed. All areas to be treated should be cleaned of all contamination including oil, grease dirt and other foreign matter. Subsequent blast cleaning should overlap existing sound coatings.

## **Site Application**

Prior to the use of any site applied products, all shop applied coatings must be examined for cleanliness and damage. Damage must be repaired to in-shop specifications and all areas must be thoroughly cleaned before further coatings are applied. Particular attention must be made to ensure that any soluble salt contamination is completely removed.



## SSPC Preparation Descriptions

### SSPC-SP5

A White Metal Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods. For complete instructions, refer to Joint Surface Preparation Standard SSPC-Sp5/NACE No.1.

### SSPC-SP10

A Near-White Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than five percent of each square-inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods. For complete instructions, refer to Joint Surface Preparation Standard SSPC-SP10/NACE No.2.

### SSPC-SP6

A Commercial Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 33 percent of each square –inch of surface area and may consist of light shadows , slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods. For complete instructions, refer to Joint Surface Preparation Standard SSPC-SP6/NACE no.3.



## **SSPC-SP7**

A Brush –Off Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust, and loose paint. Tightly adherent mill scale, rust, and paint may remain on the surface.

Mill scale, rust, and coating are considered adherent if they cannot be removed by lifting with a dull putty knife. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods. For complete instructions, refer to Joint Surface Preparation Standard SSPC-SP7/ NACE No.4.