

Section I

Surface Preparation

Surface Preparation - An Overview

<u>SSPC</u>	<u>NACE</u>	<u>SWEDISH(ISO)</u>	<u>DESCRIPTION</u>
SP 1			SOLVENT CLEANING
SP 2		St 2	HAND TOOL CLEANING
SP 3		St 3	POWER TOOL CLEANING
SP 4			FLAME CLEANING OF NEW CONCRETE
SP 5	No. 1	Sa 3	WHITE METAL BLAST
SP 6	No. 3	Sa 2	COMMERCIAL BLAST
SP 7	No. 4	Sa 1	BRUSH-OFF BLAST
SP 8			ACID PICKLING
SP 10	No. 2	Sa 2 ½	NEAR WHITE BLAST
SP 11			POWER TOOL CLEANING TO BARE METAL
SP 12	No. 5		HIGH AND ULTRA-HIGH PRESSURE WATER JETTING
SP 13	No. 6		SURFACE PREPARATION OF CONCRETE
SP 14	No. 8		INDUSTRIAL BLAST

SSPC-SP 1- Solvent Cleaning

- A method for removing all visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants from steel surfaces.
- It is intended that solvent cleaning be used prior to the application of paint and in conjunction with other surface preparation methods specified for the removal of rust, mill scale or paint.

SSPC-SP 2 - Hand Tool Cleaning

- A method of preparing steel surfaces by the use of non-powered hand tools.

SSPC-SP 2 - Definition

- Hand Tool Cleaning removes all loose mill scale, loose rust, loose paint, and other loose detrimental foreign matter. It is not intended that adherent mill scale, rust and paint be removed by this process. Mill scale, rust, and paint are considered adherent if they cannot be removed by lifting with a dull putty knife.

SSPC-SP 3 -Power Tool Cleaning

- A method of preparing steel surfaces by the use of power assisted hand tools.

SSPC-SP 3 -Definition

- Power Tool Cleaning removes all loose mill scale, loose rust, loose paint, and other loose detrimental foreign matter. It is not intended that adherent mill scale, rust and paint be removed by this process. Mill scale, rust and paint are considered adherent if they cannot be removed by lifting with a dull putty knife.

SSPC-SP 11

Power Tool Cleaning To Bare Metal

- A method of preparing steel surfaces by the use of power assisted hand tools all the way to the bare substrate.

SSPC-SP 11 - Definition

- Metallic surfaces prepared to this specification, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxide corrosion products, and other foreign matter. Slight residues of rust and paint may be left in the lower portion of pits if the original surface is pitted.

SSPC-SP 11 Continued

- When painting is specified, the surface shall be roughened to a degree suitable for the specified paint system. The surface profile shall not be less than 1 mil (25 microns).

Abrasive Blast

- SSPC-SP 5/NACE No. 1 – White Metal Abrasive Blast
- SSPC-SP 10/NACE No. 2 – Near White Metal Abrasive Blast
- SSPC-SP 6/NACE No. 3 – Commercial Abrasive Blast
- SSPC-SP 14/NACE No. 8 – Industrial Abrasive Blast
- SSPC-SP 7/NACE No. 4 – Brush-off Abrasive Blast

SSPC-SP 5/NACE No. 1- White Metal Blast

- When viewed without magnification shall be free of all visible oil, grease, dust, dirt, mill scale, rust, coating, oxides, corrosion products, and other foreign matter.

SSPC-SP 10/NACE No. 2 – Near White Metal Blast

- When viewed without magnification shall be free of all visible oil, grease, dust, dirt, mill scale, rust, coating, oxides, corrosion products, and other foreign matter except random staining, which shall be limited to no more than 5% of each unit area of surface (3" X 3") 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 coating.

SSPC-SP 6/NACE No. 3 - Commercial Blast

- When viewed without magnification shall be free of all visible oil, grease, dust, dirt, mill scale, rust, coating, oxides, corrosion products, and other foreign matter, except random staining which shall be limited to no more than 33% of each unit 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 coating.

SSPC-SP 14/NACE No. 8 - Industrial Blast

- When viewed without magnification shall be free of all visible oil, grease, dust, and dirt. Traces of tightly adherent mill scale, rust, and coating residues are permitted to remain in 10% of each unit surface area if they are evenly distributed. The traces shall be considered tightly adherent if they cannot be removed by with a dull putty knife. Shadows, streaks, and discolorations caused by stains of rust, mill scale and previously applied coating may be present on the remainder of the surface.

SSPC-SP 7/NACE No. 4 - Brush-Off Blast

- When viewed without magnification shall be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust, and loose coating. Tightly adherent mill scale, rust and coating may remain on the surface. Mill scale, rust, and coating are considered tightly adherent if they cannot be removed by lifting with a dull putty knife.

SSPC-SP 8 - Method 2

- 5 – 10% by weight inhibited sulfuric acid at 140°F minimum until all the rust and scale are removed; then thorough rinsing in clean water, then immersion for one to five minutes in 1 – 2 % by weight phosphoric acid containing about 0.3 – 0.5% iron phosphate at a temperature of about 180°F.

SSPC-SP 12/NACE No.5

High and Ultra-High Pressure Water Jetting

- Up to 5,000 psi is Low Pressure Water Cleaning
- 5,000 to 10,000 psi is High Pressure Water Cleaning
- 10,000 to 25,000 psi is High Pressure Water Jetting
- Above 25,000 psi is Ultra-High Pressure Water Jetting

SSPC-SP 12/NACE No.5

Visual Definitions

- WJ-1 Surface shall be free of all previously existing visible rust, coatings, mill scale and foreign matter and have a matte metal finish.
- WJ-2 Surface shall be cleaned to a matte finish with at least 95% of the surface area free of all previously existing visible residues and the remaining 5% containing only random stains of rust, coatings and foreign matter.

SSPC-SP 12/NACE No. 5

Visual Definitions, cont'd

- **WJ-3** Surface shall be cleaned to a matte finish with at least 2/3 of the surface free of all visible residues (except mill scale), and the remaining 1/3 containing only randomly dispersed stains of previously existing rust, coatings, and foreign matter.
- **WJ-4** Surface shall have all loose rust, mill scale and coatings uniformly removed.

SSPC-SP 12/NACE No. 5

Non-visual Definitions

- SC-1 Shall be free of all detectable levels of soluble contaminants (chlorides, ferrous salts, and sulfates).
- SC-2 Shall have less than 7 micrograms/cm sq chlorides, less than 10 micrograms/cm sq soluble ferrous salts and less than 17 micrograms/cm sq sulfate contaminants.
- SC-3 Shall have less than 50 micrograms/ cm sq chloride and sulfate contaminants.

SSPC-SP 12/NACE No. 5

Flash Rusting (light)

- Light Flash Rusting (L) When viewed without magnification, small quantities of light tan-brown rust will partially discolor the original metallic surface. This layer may be evenly distributed or in patches, but will be tightly adherent and will not be heavy enough to easily mark objects brushed against it.

SSPC-SP 12/NACE No. 5

Flash Rusting (moderate)

- Moderate Flash Rusting (M) When viewed without magnification, a layer of dark tan-brown rust will obscure the original metallic surface. This layer may be evenly distributed, or in patches, but it will be heavy enough to mark objects brushed against it.

SSPC-SP 12/NACE No. 5

Flash Rusting (heavy)

- Heavy Flash Rusting (H) When viewed without magnification, a heavy layer of dark tan-brown rust will completely obscure the original metallic surface. This layer of rust will be loosely adherent and will easily mark objects brushed against it.

Surface Preparation

Commentary

- In the event of a conflict between the visual and the written standard, the written standard shall prevail.

Surface Preparation

Summary

- This concludes our review of SSPC/NACE surface preparation standards for preparing a substrate prior to the application of a protective coating or lining.
- The written standard, in conjunction with the visual standards will give you the tools you need to identify the varying degrees of surface preparation.

Surface Preparation

Summary, continued

- In the event of a conflict between the written standard and the visual standard, the written standard shall prevail.
- Nothing will take the place of experience. Use every opportunity to observe and to learn.

Section II- Part B Abrasives

What is an Abrasive Blast Cleaning?

Abrasive blast cleaning is a battering or bombarding of the work surface by continuing impact of abrasive particles propelled by compressed air through a nozzle, or by centrifugal force from an airless blast wheel.

How Does Abrasive Blast Cleaning Work?

For abrasive particles to affect a change in the work surface, the stress exerted by the particle at the point of impact must exceed the strength of the work itself.

Factors Determining Stress Exerted by Abrasive Particles

- Energy contained in the propelled abrasive particle.
- Area upon which that energy is expended, and the angle of impingement.

Factors - continued

- Strength and hardness of the work being cleaned.
- Strength and hardness of the abrasive particles.

Kinetic Energy

Where,

- M = Mass, or size of the particle.
- V = Velocity, which is governed by air pressure in airblast systems, or by the combination of wheel peripheral speed, wheel diameter and shape and length of the wheel blade in centrifugal blast cleaning.

Abrasive Parameters

- Four parameters determine the performance of an abrasive:
 - Shape
 - Hardness
 - Density
 - Size

Shape – Angular vs Round

- Angular particles are best suited for removal of soft friable surface contaminants such as paint, rust and dirt. They produce an angular, rough profile.
- Round particles are best suited for removal of brittle contaminants such as mill scale. They produce a peened, rounded profile.

Hardness – Hard vs Soft

- Hard, tough particles used where primary objective is to remove surface contaminants. They minimize dusting, leave less residue, and are recyclable.
- Soft particles are used for removing grease, dirt, and other deposits from motors, paint films, etc.

Density – Dense vs Light

Generally, the greater the density of the particle, the more effective it is as an abrasive. Remember, kinetic energy is related to the mass of the particle, so increasing the mass increases the amount of work done by each particle.

Size – Large vs Small

Cleaning rate is affected by particle size in that large particles will remove coarse contaminants, while smaller particles will scour out the residual fine, friable corrosion products or old paint.