The Society for Protective Coatings

SURFACE PREPARATION BY WET ABRASIVE BLAST CLEANING

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www.sspc.org
Webinar Objective

Overview of Web Abrasive Blasting
Including:

• Industry Standards
• Procedures
• Equipment
• Materials, and
• Safety

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Existing and Developing Standards

Current Standards:

• SSPC-SP 6/NACE No. 3 Commercial Blast Cleaning
• SSPC-SP 14/NACE No. 8 Industrial Blast Cleaning
  • Last Updated On January 1, 2007
  • Referenced As “Other methods of surface preparation”
  • Broadly address the use of Wet Abrasive Blasting and use of rust inhibitors
Existing and Developing Standards

• SSPC-TR 2/NACE 6G198 JOINT TECHNICAL REPORT - Wet Abrasive Blast Cleaning
  • Last Updated on November 1, 2004
  • Addresses
    • Description & Use
    • Procedures For Use
    • Types of Wet Blasting Systems
    • Selection of Abrasives
    • Rust Inhibitors & Compatibility with Coating
    • Operation of Equipment
    • Safety

• http://www.sspc.org
Existing and Developing Standards

- **SSPC-VIS 5/NACE VIS 9**
  - Guide and Reference Photographs for Steel Surfaces Prepared by Wet Abrasive Blast Cleaning

- **ISO 8504-2:2000**
  - Preparation of steel substrates before application of paints and related products – Surface preparation methods – Part 2: Abrasive blast cleaning

- **ISO 8501: Corrosion Protection of Steel Structures by Painting**
  - **ISO 8501-1:2007** – Rust grades and preparation of uncoated steel substrates and steel substrates after overall removal of previous coatings
  - **ISO 8501-4:2006** – Initial surface conditions, preparation grades and flash rust grades in connection with high pressure water jetting
New Wet Abrasive Blasting Standards

- **SSPC/NACE 2016 WAB Standard Publications:**
  - SSPC-SP 5 (WAB)/NACE WAB-1
    - White Metal Wet Abrasive Blast Cleaning
  - SSPC-SP 10 (WAB)/NACE WAB-2
    - Near-White Metal Wet Abrasive Blast Cleaning
  - SSPC-SP 7 (WAB)/NACE WAB-4
    - Brush-Off Wet Abrasive Blast Cleaning
  - SSPC-SP 6 (WAB)/NACE WAB-3
    - Commercial Wet Abrasive Blast Cleaning
  - SSPC-SP 14 (WAB)/NACE WAB-8
    - Industrial Wet Abrasive Blast Cleaning
PROCEDURES

Prior To Wet Abrasive Blasting, Contractor Must Consider

• Planning
• Training
• Staging

SSPC Standards Focus On:

• Pre-Blasting Surface Preparation
• Blasting Operation
• Post Blasting Operation
PROCEDURES

Planning:

• Equipment
• Supplies
• Personnel
• Training Requirements

Planning Makes Or Breaks The Contractor

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PROCEDURES

Training

• Abrasive Blasting Program (C7)
  • Surface Preparation
  • Nozzle Blasting System Components
  • Abrasive Characteristics, Types, and Specifications
  • Wheel Blast Equipment Types, Set up, Operation, Maintenance
PROCEDURES

Staging

• First Step Of A Successful Job
  • Equipment
  • Supplies
  • Personnel
  • Support

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Order of Surface Prep Quality:

1. White Metal: SSPC-SP5   SSPC-SP5 (WAB)
2. Near White Metal: SSPC-SP10 SSPC-SP10 (WAB)
3. Commercial: SSPC-SP6   SSPC-SP6 (WAB)
4. Industrial: SSPC-SP14  SSPC-SP14 (WAB)
5. Brush-Off: SSPC-SP7   SSPC-SP7 (WAB)
## Overview of Surface Prep Quality

<table>
<thead>
<tr>
<th>Standard</th>
<th>Name</th>
<th>Free of Oil, Grease, Dirt, Dust, <strong>Loose</strong> Mill Scale, Rust &amp; Coating Residues</th>
<th>Traces of Tightly Adherent Mill Scale, Rust, &amp; Coating Residue</th>
<th>Shadows, Streaks &amp; Discolorations Caused by Stains Of Rust, Mill Scale &amp; Previously Applied Coating</th>
<th>Flash Rust</th>
<th>Procurement Doc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSPC-SP5</td>
<td>White</td>
<td>100% Not Acceptable</td>
<td>Not Acceptable</td>
<td>Not Acceptable</td>
<td></td>
<td>Procurement Doc.</td>
</tr>
<tr>
<td>SSPC-SP10</td>
<td>Near White</td>
<td>100% Not Acceptable</td>
<td>5%</td>
<td></td>
<td></td>
<td>Procurement Doc.</td>
</tr>
<tr>
<td>SSPC-SP6</td>
<td>Commercial</td>
<td>100% Not Acceptable</td>
<td>33%</td>
<td></td>
<td></td>
<td>Procurement Doc.</td>
</tr>
<tr>
<td>SSPC-SP14</td>
<td>Industrial</td>
<td>100% 10%</td>
<td>Acceptable</td>
<td></td>
<td></td>
<td>Procurement Doc.</td>
</tr>
<tr>
<td>SSPC-SP7</td>
<td>Brush-Off</td>
<td>100% No Limit</td>
<td>No Limit</td>
<td></td>
<td></td>
<td>Procurement Doc.</td>
</tr>
</tbody>
</table>
PROCEDURES

Flash Rust Definitions:

• No Flash Rust
• Light (L) Flash Rusted Surface
• Moderate (M) Flash Rusted Surface
• Heavy (H) Flash Rusted Surface
PROCEDURES

SSPC Flash Rust Definitions:

<table>
<thead>
<tr>
<th>Flash Rust</th>
<th>Visual Surface</th>
<th>Surface Adherence (Wiping Cloth Test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>None</td>
<td>N/A</td>
</tr>
<tr>
<td>Light</td>
<td>Small Quantities With Surface Visual</td>
<td>Not Easily Removed</td>
</tr>
<tr>
<td>Moderate</td>
<td>Layer That Obscures</td>
<td>Light Marks</td>
</tr>
<tr>
<td>Heavy</td>
<td>Layer That Hides</td>
<td>Significant Marks</td>
</tr>
</tbody>
</table>

- SSPC-VIS 5/NACE VIS 9,
  - Guide and Reference Photographs for Steel Surfaces Prepared by Wet Abrasive Blast Cleaning

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PROCEDURES

Procedures Before Wet Abrasive Blast Cleaning

• Remove Visible Oil, Grease, & Contaminants
• Surface Imperfections
• Surface Inspection

Not Included In the Standard

• Staging Complete
• PPE & Training Complete
PROCEDURES

Procedures Following Wet Abrasive Blast Cleaning

• Removal of Visible Deposits or Oil, Grease & Other Contaminants
• Meet Surface Conditions Defined By Project Specifications
• Amount of Flash Rust Restricted By Project Specifications
• Removal of Abrasive Adherent To The Surface Prior To Coating Operations
• Removal of Dust & Loose Residues
• Drying Of Surface Prior To Coating Operation or Further Surface Rusting
• Final Inspection of Surface Imperfections

Non-mandatory Flash Rust Testing

• Tape Pull Test
• Wipe Test
# PROCEDURES

## Tape Pull Test:

<table>
<thead>
<tr>
<th>Flash Rust</th>
<th>10th Try Tape Appearance</th>
<th>Appearance Of Test Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>No Discoloration</td>
<td>No Rust</td>
</tr>
<tr>
<td>Light</td>
<td>No Rust On Tape</td>
<td>No Change In Surface Appearance</td>
</tr>
<tr>
<td>Moderate</td>
<td>Slight Rust On Tape</td>
<td>Significant Change To Test Area</td>
</tr>
<tr>
<td>Heavy</td>
<td>Significant Rust On Tape</td>
<td>Significant Change To Test Area</td>
</tr>
</tbody>
</table>
### PROCEDURES

#### Wipe Test

<table>
<thead>
<tr>
<th>Flash Rust</th>
<th>Visual Surface</th>
<th>Surface Adherence (Wiping Cloth Test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>None</td>
<td>NA</td>
</tr>
<tr>
<td>Light</td>
<td>Small Quantities With Surface Visual</td>
<td>Not Easily Removed</td>
</tr>
<tr>
<td>Moderate</td>
<td>Layer That Obscures</td>
<td>Light Marks</td>
</tr>
<tr>
<td>Heavy</td>
<td>Layer That Hides</td>
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</table>

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Equipment

Types of Wet Blasting Systems

  • Radial Water Injectors
  • Coaxial Water Injectors
  • Slurry Blasters
  • Water Blast With Abrasive Injection
Radial Water Injectors (Water Rings)

1. High Pressure Water is injected at an angle toward the center of the blast stream as the air/abrasive stream enters the blast nozzle:
Equipment

Radial Water Injectors / Coaxial Water Injector
High Pressure Water is injected at an angle toward the center of the blast stream as the air/abrasive stream enters the blast nozzle:
Equipment

Radial Water Injectors (Water Rings)
• Low-Pressure Water Ring

The wetblast attachment suppresses blast dust to improve visibility.
Equipment

Slurry Blasters:

- Water & Abrasive Mixed In The Blast Machine
Equipment

Water Blast With Abrasive Injection:
Materials

Abrasives:
- Sand
- Slags
- Coal
- Crushed Glass
- Garnet
Materials

Rust Inhibitors For Wet Abrasive Blasting:

• Flash Rust
  • The purity of the water
  • The amount of oxygen dissolved in the water
  • The pH of the water, or a more exact way of saying this: The amount of ionic species left on the surface
• The temperature, and
• The drying time.
Types of Rust Inhibitors For Wet Abrasive Blasting:

- Barrier Film Inhibitor
- Removes Reactants That Form On The Surface
SAFETY

Three Pillars Of a Successful Contracting Business

Quality

Safety

Competitiveness

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Construction Standard Vs. General Industry

- **1926.32(g)** "Construction work." For purposes of this section, "Construction work" means work for construction, alteration, and/or repair, including painting and decorating.
SAFETY

Construction Standard: CFR 29: 1926

- [https://www.osha.gov/](https://www.osha.gov/)
- [https://www.osha.gov/dcsp/compliance_assistance/sampleprograms.html](https://www.osha.gov/dcsp/compliance_assistance/sampleprograms.html)

- Subpart E:
  - Personal Protective and Life Saving Equipment
    - 1926.103: Respiratory protection.
Proper Head, Eye, Foot, Hand & Body Protection:

• 29CFR 1926, Subpart E
  • Head Protection: Z89
  • Eye Protection: Z87
  • Foot Protection: Z41.1
• Hand & Body Protection
  • 29CFR 1926.28
Respiratory Protection:

- OSHA’s Response To Clemco’s Letter Dated April 7, 2015

http://www.clemcoindustries.com/images/pdfs/OSHA_Reply_SARs_Wet_Vapor_Blasting

In order to be excluded from the standard described above [1910.94(a)(5)(ii)(c)], where NIOSH-approved respiratory protection is required, the employer must demonstrate compliance with each of the following criteria:

1) The exposure will not exceed the PELs. The exposure data must be:
   a. Personal sample(s) analyzed utilizing accepted methodologies;
   b. Collected outside of the abrasive-blasting unit’s shroud in operator’s breathing zone (Note: The sampling cassette should be positioned as close as possible to the employee’s nose and mouth, i.e., in a hemisphere forward of the shoulders within a radius of 6 to 9 inches);
   c. Representative of the work environment without taking credit for respiratory protection;
   d. Representative of the abrasive blasting procedure with sufficient exposure data; and,
   e. Documented.
2) The abrasive blasting operator is working in an exhaust-ventilated enclosure where the operator is separated from the nozzle and blast.
3) The employer will comply with the requirements of the OSHA Respiratory Protection standard, 1910.134.
END - Questions