"Rinse Only" Painting Preparation

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OBJECTIVES

- Evaluate SCS paint performance (corrosion resistance) using only a rinse pre-treatment without phosphate wash.
- Establish recommended rinse pre-treatment parameters.

BACKGROUND

Significant laboratory testing (salt spray exposure) and practical experience has shown that SCS-processed steel has the capability to meet/exceed specifications for corrosion resistance using a "rinse-only" treatment prior to painting. The reasons are:

(1) The SCS process imparts rust-inhibiting properties to hot-rolled black carbon steel, and;

(2) The SCS process leaves it with a clean surface which promotes good paint adherence.

These attributes allow SCS-processed hot rolled to withstand 300 hour continuous salt spray exposure with a creep rating of 10 (see test results on the following page).

The implication is that conversion coating pre-treatments, such as iron phosphating, are generally not necessary prior to painting SCS material; however, an iron phosphate stage is still advisable for parts that will be subject to severe weathering or exposure cycles when placed in service. SCS samples with an iron phosphate pretreatment have been shown to withstand salt pray test exposures of 500 hours with only 3 mm of creep.

RECOMMENDATIONS

Two-Stage Rinse	One-Stage Rinse
Using conventional spray or immersion pretreatment equipment: **1. The first rinse should contain a low-foaming surfactant at a concentration of one gallon of surfactant per 1000 gallons tank volume (0.1% solution) in a recirculating stage.** **2. Follow with a clean, overflowing water rinse.**	If conventional spray or immersion pretreatment equipment is NOT available, use a high-pressure rinse or rinse with brushes using: **a low-foaming surfactant at a concentration of one gallon of surfactant per 1000 gallons volume (0.1% solution).**

On very clean SCS, it may be feasible to perform only step #1, with a surfactant at a lower concentration: ***1 quart per 1000 gallons*** *(0.04% solution). This ensures the surface is clean from dirt and oils gathered during handling, and gives it a low surface tension so that the paint will 'wet out' evenly over the SCS material during the paint curing operation.*

THE IMPORTANCE OF PAINT QUALITY

These recommendations apply where the paint system will employ a high-quality paint offering reliable corrosion resistance. Examples are 2-part epoxy, 2-part urethane, or powder paint. Lower-performing paints, such as spray alkyds (commonly known as bake enamels) do not offer corrosion protection adequate for this preparation.

Paint systems are variable and it is strongly recommended that you perform tests to ascertain the corrosion resistance your paint system is capable of providing when using these "rinse-only" preparations with SCS material.

SCS Corrosion Resistance - Post Paint #5

OBJECTIVES

- Determine performance in salt spray tests of painted SCS samples pretreated with a single stage water rinse.
- Assess feasibility of reducing or eliminating iron phosphate wash stage for select applications.

APPLICABLE STANDARDS

ASTM B117-02
Practice for Operating Salt Spray Apparatus

ASTM D1654-92
Evaluation of Painted Specimens Subjected to Corrosive Environments

ASTM D3359
Measuring Adhesion by Tape Test

Testing Lab is A2LA Accredited

TEST PROCEDURE

Four (4) flat panels of hot-rolled were put through the SCS process. The panels were given a single-stage pretreatment consisting of a high pressure water rinse, then powder coat painted. The paint was a TGIC Polyester - a good quality, common paint system - applied to between 2 and 3 mils thickness.

After the paint had cured, samples were scribed with a thin 'razor' cut all the way through to the SCS surface. All samples were were placed in a salt spray fog chamber exposed to 5% NaCl mist operating between 93 and 95 ºF. Samples were inspected at specified intervals to measure creep.

TESTING LAB

St. Louis Testing Laboratories, Inc.
Lab No. 06C-0044
Report dated January 6, 2006

The scribe marks through the paint expose the metal surface directly to the salt spray. This induces rusting and causes the paint to "creep" away from either side of the scribe mark under continued exposure. Creepage is measured as:

10 = 0 inch	6 = 1/16th to 1/8th inch
9 = 0 to 1/64th inch	5 = 1/8th to 3/16th inch
8 = 1/64th to 1/32nd inch	4 = 3/16th to 1/4th inch
7 = 1/32nd to 1/16th inch	3 = 1/4th to 3/8th inch

TEST RESULTS

Sample Number	Creepage from Scribe at increasing exposure					Results of Tape Pull Test conducted only at 384 hours exposure
	48 hrs	96 hrs	168 hrs	288 hrs	384 hrs	
1	10	10	10	10	3	removal of paint beyond scribe
2	10	10	10	10	3	removal of paint beyond scribe
3	10	10	10	10	3	removal of paint beyond scribe
4	10	10	10	10	4	removal of paint beyond scribe

CONCLUSIONS

All four samples maintained excellent corrosion resistance through the 288 hour inspection. Afterwards, corrosion set set in and accelerated to failure level over the next 100 hours.

In the prior Test #4, all SCS samples passed a 500 hour, 3mm creep test with a very lean two stage paint pretreatment consisting of iron phosphate and rinse. In Test #5 SCS samples passed 300 hours without the iron phosphate wash - the pretreatment consisted of just a rinse. To achieve comparable results, other material types must undergo various paint pretreatment stages such as cleaning and phosphating. In Test #5 SCS passed this tough corrosion test level while applying only a one stage water rinse pretreatment followed by a very common polyester paint..