

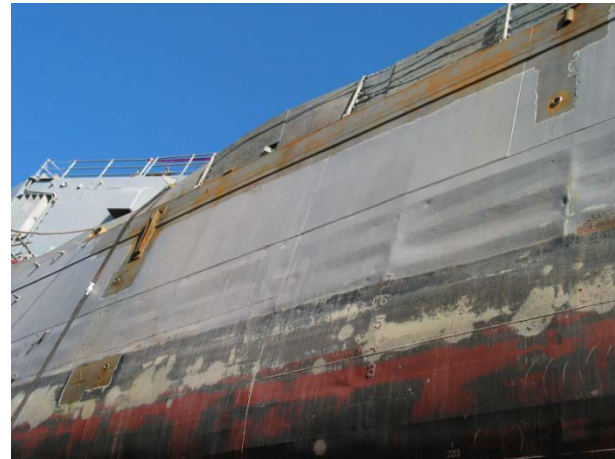
Review of Acceptable Flash Rusting for Ship Coatings

Final Report – September, 2009

Steve Cogswell, Pete Ault

The Problem:

“Hand Lance Areas” Develop Moderate Flash Rust which must be Remediated



Multiple Initiatives

- Identified ship case histories
- Handed off preliminary efforts to the Navy Cumbersome Work Practices Project (CWP 351)
 - Developing enhanced Inspection Tool
 - Evaluating consequences of “Heavy” flash rust
 - Quantifying potential cost savings
- Submitted proposal to change 009-32 to SSRAC in July, 2009
- Developed inspection guide for inspectors



Investigated Navy Ship History

- No evidence of catastrophic failure
- Work performed at multiple yards by various contractors
- Time in service up to 9 years
- USS KLACKRING (FFG 42)
- USS HUE CITY (CG 66)
- USS ROBERTS (FFG 58)
- USS BOONE (FFG 28)
- USS STENNIS (CVN-74)
- USS ENTERPRISE (CVN-65)
- USS HALYBURTON (FFG-40)
- USS THE SULIVANS (DDG-68)
- USS BELLEAU WOOD (LHA-3)
- USS LAMOURE COUNTY (LST-1194)
- USS ASHLAND (LSD-48)
- USS ESSEX (LHD-2)
- USS NASSAU (LHA-4)
- USS DULUTH (LPD-6)



Supported Navy CWP-351

- Panel testing to demonstrate performance over “Heavy” flash rust
- Preliminary exploration of flash rust test concepts
- Shipyard feedback on proposed procedure for quantifying flash rust



SSRAC Change Proposal

- Submitted July, 2009
 - Table 1, Line 1 & Table 2, Line 1
 - Change surface preparation to read "WATERJETTING TO NACE 5/SSPC-SP 12 CONDITION WJ-2/M" (instead of WJ-2/L)
- Action deferred pending completion of tool development by CWP-351 project

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SSRAC # 183
H

NAVSEA Standard Specification for
Ship Repair and Alteration Committee
(SSRAC)

2009 SSRAC MEETING

NSRP SP-3 Panel
(ACTIVITY)

Submitted by: Steve Cogswell Date: 20MAY2009
(NAME/CODE)

Item No: 009-32 Title: Cleaning and Painting Requirements

1. Paragraph No: Table 1, Page No:
Line 1 & Table 2, Line 1

2. Problem and Rationale:
Remediation of moderate flash rust in areas prepared with open
UHPWJ equipment is costly and does not appear to offer a
significant benefit in either service life or risk reduction.

3. Proposed Change:
Change surface preparation to read "WATERJETTING TO NACE 5/SSPC-SP
12 CONDITION WJ-2/M" (instead of WJ-2/L).

MAJOR MINOR

COST IMPACT? YES NO

If Yes, describe cost impact
*NSRP research has suggested that up to 20% of the surface
preparation cost of an underwater hull can be saved if the
requirement was changed.*

SCHEDULE IMPACT? YES NO

If Yes, describe schedule impact

SUBCOMMITTEE ACTION TAKEN:

STEERING COMMITTEE ACTION/INITIAL:

Recommended Guidelines for Evaluating Flash Rust

Recommended Guidelines for Evaluating Flash Rust



Prepared by:
National Shipbuilding Research Program
Surface Preparation and Coatings Panel
(NSRP SP-3)

RECOMMENDED GUIDELINES FOR EVALUATING FLASH RUST

INTRODUCTION

This guide was developed based on the work of the National Shipbuilding Research Program (NSRP) Surface Preparation and Coatings Panel, SP-3. The NSRP performed a series of projects on the inspection of flash rust and its impact on coating performance.^{1,2,3} This is a non-mandatory guide intended to help the inspector and customer to determine the level of flash rust on a surface. It is intended to supplement SSPC-VIS 4/NACE VIS 7 and SSPC-SP 12/NACE No. 5.^{4,5}

UNDERSTANDING FLASH RUST DEFINITIONS

For the purposes of this guide, the following definitions shall be used:
Flash rust is the rust that occurs on carbon steel from the time the waterjet cleaning process starts to the time the water used for the cleaning process dries. Flash rust often looks like a rust bloom.

Rust bloom is somewhat uniform rust spread evenly over a large section of the surface. Rust bloom is a generic description.

Rust-back is a term associated with dry abrasive blast standards. Rust-back occurs on surfaces that appear to be dry. Rust-back is the rust that occurs when dry, bare steel is exposed to conditions of high humidity, moisture, or a corrosive atmosphere.

CHARACTERIZATION OF FLASH RUST

Inspectors should realize that there are several criteria that are used to describe each flash rust condition. Table 1 highlights six criteria used in the definitions of flash rust levels in SSPC-SP-12/NACE No. 5 and the relevant excerpts from these definitions. Note the relatively minor variations in the descriptions, especially the differences between "Light" and "Moderate" levels of flash rust. A flash rusted area could be assigned different classifications based on the relative importance assigned to the criteria in Table 1. It is recommended that project personnel (foremen, inspectors, supervisors, manufacturer's representative, etc.) agree on interpretation of the flash rust definitions prior to the start of surface preparation. This pocket guide and "How to Inspect Flash Rust" can aid in achieving that understanding.

TIMING OF INSPECTION

The formation of flash rust may completely change the appearance of a waterjetted surface from the time immediately after waterjetting is completed to the surface evaluation prior to coating. The speed at which flash rust develops is dependent on a number of variables, including the time of wetness, temperature and humidity near the cleaned surface. Regardless of the level of flash rust allowed, all surfaces should conform with the specified degree of cleanliness (NU-1, NU-2, NU-3 or WJ-4) before the development of flash rust. When large areas are cleaned by waterjetting, flash rusting may occur, obscuring the level

	Light	Moderate	Heavy
Color	Yellow-brown	Yellow-brown	Red-brown
Dispersion	Small quantities of a rust layer evenly distributed or present in patches	Layer of rust evenly distributed or present in patches	Layer of heavy rust evenly distributed or present in patches
Adhesion	Tightly adherent	Reasonably well adherent	Loosely adherent, easily crumbled
Ease of Abrasion	Not easily removed	Leaves light marks on cloth	Leaves significant marks on cloth
Amount of rust	Lightly wiping with a cloth	Lightly wiped over the surface	Lightly wiped over the surface
Quantity of rust	Through most steel substrate may be observed	Obscures original steel surface	Hides the metal surface contour completely

Table 1
Characteristics of Flash Rust

PHOTOGRAPHS



Photo 1 – Standard woven cotton cloth and 4-inch nylon bristle brush used for the brush-cloth wiping test.



Photo 2 – Swipe the cloth across the surface in one motion.

Photos 5 through 7 – White cloths after inspecting light flash rusted surfaces.

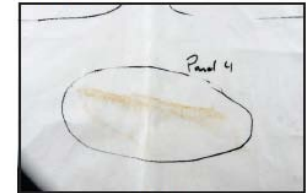


Photo 5

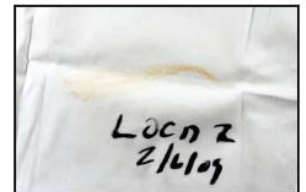


Photo 6

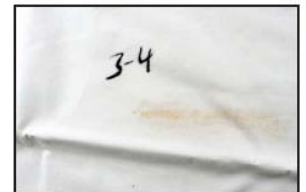


Photo 7

- Developed based on NSRP Flash Rust Projects
- Printed 100 field guides for distribution

Questions?

Finally

