

SSPC: The Society for Protective Coatings

PAINTING SYSTEM GUIDE 19.00

Guide for Selecting Painting Systems for Ship Bottoms¹

1. Scope

1.1 This guide covers painting systems for ship bottoms from the keel to the light load line on steel ships. The area from the light load line to the deep load line, more commonly called the boottop area, may also be coated with these systems; however, SSPC-PS Guide 20.00 covers painting systems for this area. It should be noted that boottops are rarely used with today's commercial ships, and bottom systems may extend up to the deep load line.

1.2 These coating systems may also be used for other floating or stationary structures exposed to or submerged in salt or brackish water. This would include barges, buoys, oceanographic installations, etc.

2. Description

2.1 This guide outlines the components of a complete painting system for the protection of the exterior bottoms of steel ships operating primarily in salt or brackish waters. It consists of surface preparation for both new construction and for maintenance and repair of existing ships, prime coats, or intermediate anti-corrosive coats and antifouling finishes.

3. Referenced Standards

3.1 The latest issue, revision, or amendment of the referenced standards in effect on the date of invitation to bid shall govern, unless otherwise specified.

3.2 If there is a conflict between the requirements of any of the cited referenced standards and this specification, the requirements of this specification shall prevail.

3.3 SSPC STANDARDS AND JOINT STANDARDS:

PA 1	Shop, Field, and Maintenance Painting of Steel
PA 2	Measurement of Dry Coating Thickness With Magnetic Gages
PA Guide 4	Guide to Maintenance Repainting with Oil Base or Alkyd Painting Systems
Paint 16	Coal Tar Epoxy Polyamide Black

Paint 17	(or Dark Red) Paint
Paint 18	Chlorinated Rubber Primer
	Chlorinated Rubber Intermediate Coat Paint
Paint 19	Chlorinated Rubber Topcoat Paint
Paint 27	Basic Zinc Chromate – Vinyl Butyral Wash Primer
PS Guide 20.00	Guide for Selecting Painting Systems for Boottoppings
PS Guide 22.00	Guide for Selecting One-Coat Preconstruction or Prefabrication Painting Systems
SP 5/NACE No. 1	White Metal Blast Cleaning
SP 7/NACE No. 4	Brush-Off Blast Cleaning
SP 10/NACE No. 2	Near-White Blast Cleaning

3.4 AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) STANDARD:

D 3925	Standard Practice for Sampling Liquid Paints and Related Pigmented Coatings
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3.5 FEDERAL SPECIFICATIONS AND STANDARDS:

DoD-P-15931	Paint, Antifouling, Vinyl (Formerly MIL-P-15931)
MIL-PRF-23236	Paint Coating Systems, Fuel and Salt Water Ballast Tanks (Formerly MIL-P-23236 or DoD-P-23236; Cancelled, Use MIL PRF 23236C)
MIL-DTL-24441	Paint, Epoxy-Polyamide, General Specification (Formerly MIL-P-24441; Use MIL PRF 23236C)

4. Surface Preparation

4.1 NEW CONSTRUCTION: The surface should be abrasive blast cleaned as specified in SSPC-SP 10, "Near-White Blast Cleaning." If specified in the procurement documents, a better degree of blast cleaning shall be substituted (SSPC-SP 5). If preconstruction primers are to be used the surface

¹ This paint contains chromate pigments. Users are urged to follow all health, safety, and environmental requirements in applying, handling or disposing of these materials.

preparation is to be as specified in SSPC-Guide 22.00, "Guide for Selecting One-Coat Preconstruction or Prefabrication Painting Systems."

4.2 MAINTENANCE AND REPAIR OF EXISTING SHIPS:

Immediately upon docking, the entire bottom should be washed with fresh water at high pressure to remove marine fouling, loosely adhering paint, salt deposits, and calcareous deposits from cathodic protection. High pressure water cleaning equipment should operate at approximately 14 to 21 Mpa (2,000 to 3,000 psi) for proper removal.

COMMENT: Once the hull has been cleaned and has dried, the entire bottom should be carefully inspected for coating system breakdown. For large areas of breakdown, abrasive blasting to the degree required by the coating system is recommended. For tenaciously adhering fouling, SSPC-SP 7, "Brush-Off Blast Cleaning," may be required. SSPC-SP 7 may also be required for proper adhesion of the new coating to certain aged coatings, e.g., epoxy, etc.

5. Paints

A shipbottom coating system consists of anti-corrosive and/or barrier coatings overcoated with appropriate antifouling paint. The following outlines accepted coating systems, recommended number of coats, appropriate antifouling paint, and maintenance and repair procedures. Special notations and comments follow for each shipbottom coating system. Table 1 summarizes these recommendations.

5.1 BITUMINOUS ALUMINUM PIGMENTED SYSTEM:

Aluminum flake-filled solution of various melting point bituminous resins.

COMMENT: The greatest attribute of this system is its ease of scheduling maintenance. Surface preparation is not as demanding as for epoxy, vinyl, or chlorinated rubber systems. These are single-package and can be supplied as high-build paints. As these products dry by solvent evaporation, restrictions of temperature during application are equal to both vinyl and chlorinated rubber systems. Abrasion resistance is fair.

Due to the solvent sensitivity of these systems, application of the conventional rosin-based antifouling can be achieved at any time. The surface must be clean, dry, and free of all contaminants. In addition, conventional anti-fouling based on rosin modified with esterified rosins or oils may be used. These coatings are generally filled with inert extenders and cuprous oxide and are not considered scrubbable.

5.2 VINYL SYSTEM: After cleaning, the steel shall be pretreated with a wash primer to improve adhesion. Apply the first coat of vinyl primer as soon as practical and preferably within 24 hours after the application of the wash primer.

Application of the vinyl antifouling can be at any time provided the anti-corrosive system is clean, dry, and free of surface contaminants.

COMMENT: The greatest attribute of a vinyl anti-corrosive

system is the rate of cure achieved at low temperatures. They are also single-package for ease of application. As these are thermoplastic in nature, intercoat adhesion after long service times is excellent when overcoating clean, dry, aged vinyls with new vinyl systems. This property makes these systems very good for maintenance and repair.

These systems have low volume solids and require multiple coats to achieve the proper dry film thicknesses. High-build products are possible, but care must be taken to ensure that all the solvents are released prior to putting into service. Abrasion resistance is inferior to pure epoxy or flake glass epoxy or polyester systems.

5.2.1 Wash Primer Pretreatment: Use SSPC-Paint 27*, "Basic Zinc Chromate Vinyl Butyral Wash Primer":

COMMENT: This paint is an alcohol solution of polyvinyl butyral resin pigmented with basic zinc chromate reacted with an alcohol solution of phosphoric acid just prior to use.

5.2.2 Vinyl Antifouling Coating: DOD-P-15931, "Paint Antifouling, Vinyl," Formulas 121 or 129:

COMMENT: These are based on vinyl resin and rosin, filled with inert extenders and cuprous oxide. Formula 129 (Black) is less effective than Formula 121 (Red), and is normally used only on boottop areas where black color is required.

5.3 Catalyzed Epoxy: MIL-DTL-24441, "Paint, Epoxy Polyamide, General Specification for,":

COMMENT: These are polyamide epoxies unmodified with hydrocarbon resins, tars, or other vehicle extenders. They can be chemically cured with amine or polyamide resins. (MIL-DTL-24441 has replaced MIL-P-24441.)

For maximum performance on fast ships that are expected to see long service, unmodified epoxy will also offer excellent abrasion resistance. Generally, these are high-build products which minimize the number of coats necessary to meet thickness requirements.

Generally, epoxy systems have poor curing characteristics at temperatures below 10°C (50°F). Below this temperature, intercoat adhesion is only poor to fair with most epoxy coatings. After long-term exposure, surface preparation in the maintenance and repair of these systems must be handled under close supervision.

The first coat of vinyl antifouling should be applied while the last coat of the epoxy anticorrosive is still in the "tacky" stage of cure. To determine suitability of the epoxy coat, simply press the thumb to the epoxy coated surface. If the epoxy is firm to the touch, yet leaves a thumb print in the coating, the epoxy is ready to receive the first coat of antifouling.

5.4 CHLORINATED RUBBER: SSPC-Paint 17, "Chlorinated Rubber Inhibitive Primer," SSPC-Paint 18, "Chlorinated Rubber Intermediate Coat Paint," and SSPC-Paint 19, "Chlorinated Rubber Topcoat Paint," and chlorinated rubber antifouling paint:

COMMENT: These single-package, generally high-build