

APPENDIX 1

SURFACE MAINTENANCE ENGINEERING PLANNING PROGRAM

DM# 330-001 SURF






SURFACE MAINTENANCE ENGINEERING PLANNING PROGRAM




ENGINEERING DESIGN MEMO NO. 330-001 SURF

SHIP: DDG 51 CLASS ONLY

TITLE: UNDERWATER HULL: PRESERVE UTILIZING OEM REPRESENTATIVE

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SIGNATURE:  01 JUN 20	SIGNATURE:  06 JUNE 2020	SIGNATURE:  22 JUN 2020

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REVISION 02

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REVISION RECORD

REVISION NUMBER	TITLE OR SUMMARY	APPROVING OFFICIAL	REVISION ISSUE DATE
00	ORIGINAL ISSUE	K. BUCKLEY	-
01	UPDATED GN2 TO REMOVE “AND PROVIDED AS GOVERNMENT FURNISHED MATERIAL”. CHANGE APPROVED VIA TELECOM WITH CNRMC (05 MAR 2020), AND BY NAVSEA05P VIA EMAIL DTD 05 MAR 2020; AND UPDATED FORMATING.	K. BUCKLEY	06 MAR 2020
02	UPDATED REF TABLE; SINGLED UP OEM COATING REP AS CONSISTENTLY USED TITLE, DEFINED “HOLD POINT”, REMOVED CHECKPOINT DESIGNATORS & INSERTED CHECKPOINT DIRECTIONS INTO STEPS ALLOWING FOR CLARITY WITHIN CSWT	K. BUCKLEY	09 JUN 2020

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REFERENCES			
REF	NUMBER	TITLE	APPLICABILITY
a	ASTM F718	NAVSEA Reviewed ASTM F718	DDG 51 CL
b	VOL 2	Systems and Specifications, SSPC Painting Manual	DDG 51 CL
c	ASTM DD4417	Standard Test	DDG 51 CL
d	ISO 8502-3	Assessment of Dust on Steel Surfaces Prepared for Painting (Pressure Sensitive Tape Method)	DDG 51 CL

GENERAL NOTES

1. This design memorandum was developed to provide guidance for the underwater hull preservation of DDG 51 Class Arleigh Burke Class Destroyer.
2. Original Equipment Manufacturer (OEM) Coating Representative will serve as a Trusted Government Agent; this field service technical representative will provide on-site support for Underwater Hull Preservation. OEM Coating Representative will assist the Government with the observation of tests and inspections, as well as technical resolution associated with Underwater Hull Preservation.
3. Paint must not be thinned.
4. Prior to applying a coat, the previous coat must be approved by the OEM Coating Representative properly cured and ready for the follow on coating.
5. The contractor must not proceed past a “hold point” until the OEM Coating Representative grants permission to proceed to the next step in the procedure.

Hold point is defined as the point at which work cannot proceed until the quality of the work is verified by the OEM Coating Representative and direction is provided to proceed.

The contractor must provide notification to the OEM Coating Representative and Naval Supervising Activity (NSA) SUPERVISOR for all Objective Quality Evidence (OQE) and/or testing required.

6. The OEM Coating Representative may accept and/or witness in process work, completed work, testing or inspections.
7. The contractor must maintain records of completed Test and Inspection Records (TIRs), including inspection records generated by all subcontractors for a minimum period of ninety (90) days after contract completion. Submit one legible copy, in hard copy or approved transferrable media, of reports listing results of the requirements of the TIRs to the SUPERVISOR.
8. Do not perform painting between the hours of sunset and 0800 without prior written approval of the OEM Coating Representative and SUPERVISOR.
9. Each undercoat must be of a different color to make holidays and inadequate coverage readily apparent, with the exception of the third coat of the boot-top, which must be black.
10. For interior surfaces of stern tubes and extensions, strut barrels, fairwater interiors, shaft flanges (not exposed to seawater) and coupling covers, do not apply antifouling (AF) topcoat.

1. Surfaces addressed by this memorandum are:
 - a. Underwater Hull Surface, Keel to Upper Boot Top Limit, including each bilge keel, skeg, stem bar, rope guard, fairwater, appendage, fairing, rudder, rudder stool interior and exterior, sea chest and associated strainer plate, stern tube barrel interior and exterior, strut, strut barrel interior and exterior, grating, each suction and discharge from shell plate flange inboard to the first sea valve and each hull draft mark.
2. Contractor Inspection Records: The contractor must prepare a TIR for this work item. It must include the following as a minimum:
 - a. Identification by solicitation/contract number, ship name, and government work item number.
 - b. Identification of each surface to be inspected by name, number, and location. Where multiple surfaces are contained within the work item, an entry on the TIR must be made for each surface.
 - c. The listing of each specific inspection attribute method of inspection or test, and the acceptance/rejection criteria.
 - d. All TIRs must be updated as work progresses and maintained current to within twenty-four (24) hours. Submit one legible copy, in hard copy or approved transferrable media, of a report listing results of the requirements of TIRs to the SUPERVISOR and OEM Coating Representative at the time of the scheduled hold points.
 - e. Submit one legible copy, in hard copy or approved transferrable media, of the Paint Report to the SUPERVISOR and OEM Coating Representative within three (3) days of completing the coating application or prior to Undocking Certification, whichever comes first. The report must include the following data:
 - 1) The location, date, and time when each coat of the paint system started to be applied and the time when application of each coat ceased.
 - 2) The ambient and substrate temperatures, relative humidity and dew point temperatures as directed in paragraph 12(a).
 - 3) The time interval between applications of the previous coat ceased and when application of the next coat started.
 - 4) Dry Film Thickness (DFT) readings of each coat of the paint system. Wet Film Thickness (WFT) readings are required in lieu of DFT readings for the second anticorrosive coat that

must be in a tacky state when the first AF topcoat is applied. Paint manufacturer, product identification number, color, expiration date, and batch numbers for each coat of paint applied.

- 5) Surface profile measurements of the metal substrate.
- 6) Results of testing for non-visible surface contaminants (soluble salts).
- 7) Results of testing for dust on surface.
- 8) Minimum and maximum storage temperature of the coating over the 24 hour period prior to use.

3. Coating Storage: Receive from OEM Coating Representative and store in a cool, dry place the anti-corrosive (AC) and antifouling (AF) paints. Do not expose to freezing temperatures or direct sunlight. For all coatings, storage ambient temperature must be maintained between 50 and 90 degrees Fahrenheit, or within the manufacturer's recommended storage temperature in accordance with reference (a), or within some other storage temperature range approved in writing by the OEM Coating Representative and the SUPERVISOR.

- a. Monitor the storage temperature from receipt to at least a 24 hour period prior to initiation of the application process and document the minimum and maximum temperatures. Record temperature once per shift and not to exceed twelve (12) hours if recording manually.

NOTE: Manual readings are not necessary if monitoring equipment is used that tracks minimum and maximum temperature for the 24 hour period.

4. Qualifications and Certifications: Maintain the following certifications for accomplishing preservation operations to areas listed in paragraph 1(a). Information for these certifications can be found at www.sspc.org and www.naceinstitute.org/certification.
 - a. Organizations performing blasting operations (abrasive and water-jetting) or coating application must be certified in accordance with Quality Process 1 (QP1) outlined in reference (b) (with the exception of the Coating Application Specialist (CAS) requirement) or NAVSEA approved equivalent.
 - b. Spray painters must be currently certified in accordance with Society for Protective Coatings (SSPC) C-12, SSPC C-14, SSPC CAS Level 2, or NAVSEA approved equivalent. For equivalent certifications, a copy of the NAVSEA approval letter must be maintained by the repair activity.
 - c. Plural Component Pump Tenders and Applicators must be currently certified in accordance with

- SSPC C-14 or NAVSEA approved equivalent certifications. For equivalent certifications, a copy of the NAVSEA approval letter must be maintained by the repair activity.
- d. Blasters must be currently certified in accordance with SSPC C-7, SSPC CAS Level 2, or NAVSEA approved equivalent. For equivalent certifications, a copy of the NAVSEA approval letter must be maintained by the repair activity.
 - e. Blasters performing Ultra High Pressure water-jetting must be currently certified in accordance with SSPC C-13 or NAVSEA approved equivalent. For equivalent certifications, a copy of the NAVSEA approval letter must be maintained by the repair activity.
5. Within twenty-four (24) hours of docking wash the entire hull, from the keel to six (6) inches above the light load line with fresh water.
- a. Water pressure must be 2,000 to 5,000 pounds per square inch (PSI).
 - b. Area included but is not limited to each: sea chest, strainer plate, thruster tunnel, bilge keel, strut and rudder.
6. **A qualified inspector from the shipyard who will not be involved with the accomplishment of this work and the OEM Coating Representative will** inspect the underwater hull preservation system for deterioration and condition of existing coatings.
7. Accomplish the requirements of reference (b), solvent cleaning to remove all dirt, oil, grease, soluble salts or other organic matter.
- a. Biodegradable cleaners or other eco-friendly methods/agents must be used to the greatest extent.
8. Ensure prior to surface preparation to accomplish the following:
- a. Install temporary protective covering on each bearing, propeller, zinc anode, impressed current system, fathometer, sea valve, rodmeter, main propulsion shafting, rudder seal, transducer, emitter belt, rope guard, coupling guard, fairwater, and sonar dome rubber window by masking or otherwise sealing with blast resistant material while cleaning and painting.
 - b. Remove each sea chest strainer plate and preserve, prepare surface to ensure a minimum profile of 2 to 4 mils deep to ensure adhesion then apply the full underwater hull coating system listed in Table One.
 - c. Remove each composite fairwater and preserve, hand sand or accomplish a light brush off blast, utilizing walnut shells to sound AC coat, abrade surface to ensure adhesion. Apply the full underwater hull coating system the exterior and the AC system listed in Table One to each interior fairwater, stern tube barrel, and barrel.

- d. Plug or install each temporary drain line on overboard discharge.
 - e. Maintain hull in a dry condition after blasting and until final coat of paint is dry.
 - f. Install a temporary 5.1 pound mild steel blank on each sea valve opening.
9. Accomplish abrasive blasting to SSPC-SP10/NACE 2, near white metal blast or water-jetting to NACE/SSPC-SP WJ-2/M or SSPC-SP10/M (WAB)/NACE WAB-2 cleaning requirements to surfaces listed in paragraph 1(a). Utilize blast media meeting the requirements of MIL-A-22262, A-A-1722, A-A-59316, SSPC-AB 3, or SSPC-AB 4 as permitted.
10. **A qualified inspector from the ship yard who did not accomplish this work and the OEM Coating Representative will** verify proper surface profile. One profile measurement must be recorded for every 200 square feet for the first 1,000 square feet; for each additional 500 square feet or less, one profile measurement must be taken. Profile measurements must be taken in accordance with Method B or C per reference (c).
- a. Following blasting or water-jetting operations, surface peak-to-valley profile must be checked. For method B per reference (c), each profile measurement must be between 2 and 4 mils. For method C per reference (c), each profile measurement must be between 2 and 4 mils, with no individual tape reading less than one (1) mil or greater than or equal to 5 mils. If such a profile is not present, repair activity must establish the proper profile.
11. For surfaces listed in paragraph 1(a), a qualified inspector from the ship yard who did not accomplish this work and the OEM Coating Representative will accomplish the requirements for conductivity or chloride measurements.
- a. Accomplish surface conductivity or chloride checks using available field or laboratory test equipment on the freshly prepared surface. One reading must be taken for every 200 square feet for the first 1,000 square feet. One determination must be conducted for every additional 500 square feet or less.

NOTE: Chloride measurements must not exceed 3 $\mu\text{g}/\text{cm}^2$ (30 mg/m^2) or conductivity measurements must not exceed 30 micro-siemens/cm.
 - b. If chloride measurements exceed 3 $\mu\text{g}/\text{cm}^2$ (30 mg/m^2) or conductivity measurements exceed 30 micro-siemens/cm, water wash the affected areas at 3,000 to 5,000 PSI with potable water. Repeat this step until satisfactory chloride measurements or conductivity measurements are at satisfactory levels.
 - c. Submit one legible copy, in hard copy or approved transferable media, of a report list results of the

requirements of the Chloride testing to the SUPERVISOR and OEM Coating Representative at the time of inspection for coating application.

12. Upon completion of exterior surface preparation, and after approval by the OEM Coating Representative, apply the coating described in Table One in accordance with reference (a) and the following:
 - a. A qualified inspector from the shipyard who did not accomplish the production work will for coatings, take ambient and substrate surface temperatures, relative humidity and dew point from conditions on-site, in close proximity to the surface to be coated. Environmental readings must be taken and recorded from the surface preparation acceptance checkpoint to forty-eight (48) hours of creditable cure time after the application of a coat.
 - 1) If a data logger is used, it must collect data a minimum of every one hour. A manual reading must be taken once every twenty-four (24) hours and at every evolution involving OEM Coating Representative or SUPERVISOR test and inspection points with a separate calibrated device independent of the data logger.
 - 2) If a data logger is not used, environmental readings must be manually taken every four (4) hours and at every evolution involving OEM Coating Representative or SUPERVISOR test and inspection points.
 - 3) Submit one legible copy, in hard copy or approved transferrable media, of a report listing results of the requirements of Environmental Readings to the SUPERVISOR.
 - b. Apply coatings when conditions meet requirements per reference (a). A qualified inspector from the shipyard who did not accomplish this work and the OEM Coating Representative will verify the ambient temperature and that the temperature of the substrate must be a minimum of 5 degrees Fahrenheit above the dew point. The maximum relative humidity for coating application is 85 percent.
 - c. Unless fully enclosed, do not perform exterior paint application when sustained winds exceed 15 miles per hour (MPH).
 - d. Manufacturer established drying times between coats per reference (a) must be followed to ensure adhesion of the subsequent coats.
 - e. Each undercoat must be of a different color to make holidays and inadequate coverage readily apparent, with the exception of the third coat of the boot-top, which must be black.
 - f. For interior surfaces of stern tubes and extensions, strut barrels, fairwater interiors, shaft

flanges (not exposed to seawater) and coupling covers, do not apply AF topcoat.

- g. A qualified inspector from the shipyard who did not accomplish this work and the OEM Coating Representative will inspect surface cleanliness for dust. One dust tape reading must be taken for every 200 square feet for the first 1,000 square feet; for each additional 500 square feet or less, one tape reading must be taken. Dust must meet Rating 2, Class 2 of reference (d).
13. Prior to applying a coat, a qualified inspector from the shipyard who did not accomplish this work and the OEM Coating Representative will verify the previous coat has properly cured and is ready for follow on coating.
 - a. Measure and record the Dry Film Thickness (DFT) of previous coating taken in accordance with SSPC-PA2 of reference (b).
 - 1) DFT of each coat must be within the limits provided in Table One and SSPC-PA2 of reference (b).
 - 2) If any coat measures less than the specified DFT, apply an additional coat of that product. The total DFT of these 2 coats must not exceed the specified maximum thickness for the original coat as specified in Table One.
 - 3) Accomplish a visual inspection for surface cleanliness. If evidence of contamination exists, accomplish degreasing/cleaning a maximum of four (4) hours prior to application of the next coat to ensure removal of surface contaminants.

TABLE ONE			
COAT	PRODUCT	COLOR	DFT
1 ST Coat AC	MIL-PRF-24647, Type I or II	RED	5-7 mils
2 nd Coat AC	MIL-PRF-24647, Type I or II	GRAY	5-7 mils
1 st Coat AF	MIL-PRF-24647, Type II	RED	5-7 mils
2 nd Coat AF	MIL-PRF-24647, Type II	BLACK	5-7 mils
3 rd Coat AF	MIL-PRF-24647, Type II	RED	5-7 mils
Underwater Hull Markings	MIL- PRF 24635 (Low Solar Absorption Only) Boottop and below	LIGHT GRAY	5-8 mils
1 st Coat Boottop AF	MIL-PRF-24647, Type II	RED	5-7 mils
2 nd Coat Boottop AF	MIL-PRF-24647, Type II	BLACK	5-7 mils
3 rd Coat Boottop AF	MIL-PRF-24647, Type II	BLACK	5-7 mils

14. Boottop must be straight and neatly cut in. The boottop is defined as the black area from minimum load waterline at which the ship is expected to operate to 12 inches above the maximum load waterline. The black paint is AF paint conforming to MIL-PRF-24647. The haze grey MIL-PRF-24635 must not overlap onto the black MIL-PRF-24647 AF topcoat.
15. Perform repairs for each new and disturbed surface.
 - a. The word “new” in “new and disturbed surfaces” refers to all material installed on the ship by the repair activity regardless of source.
 - b. Disturbed surfaces are defined as any surface that requires cleaning and/or coating due to existing coating finish being damaged in the accomplishment of work specified by the work item or task order.
 - 1) Exterior surface of underwater hull closure plates/hull accesses and their associated welds will not be considered disturbed surfaces and must be cleaned, prepared, painted and documented in accordance with the applicable area. Deviations from the requirements may be authorized by the OEM Coating Representative with SUPERVISOR concurrence based on size, location, application or severity of condition of the paint system being applied.
 - c. For individual areas 2 square feet or less totaling less than 0.03 percent of the total surface area, accomplishment of paragraph 12 documentation is not required; requirements of paragraphs 7, 8, 9, 10, 11, and 14 are waived.
16. Remove blanks, protective covering and temporary drain lines installed in paragraph 8(a) through 8(d).
17. Upon completion of hull coating, and before reinstallation of strainer plates, all sea chests and overboard discharges must be inspected by the SUPERVISOR, OEM Coating Representative, and the Ship’s Engineering Officer/Chief Engineer (CHENG) or their designee, for cleanliness and removal of plugs and blanks.
18. Upon completion of inspection, install all strainer plates and composite fairwaters removed using new Monel bolting and Monel lock-wire.