

NAVAL SEA SYSTEMS COMMAND

What's New in NAVSEA Coatings?



NSRP SPC Panel Meeting
Via Conference Call
March 2021

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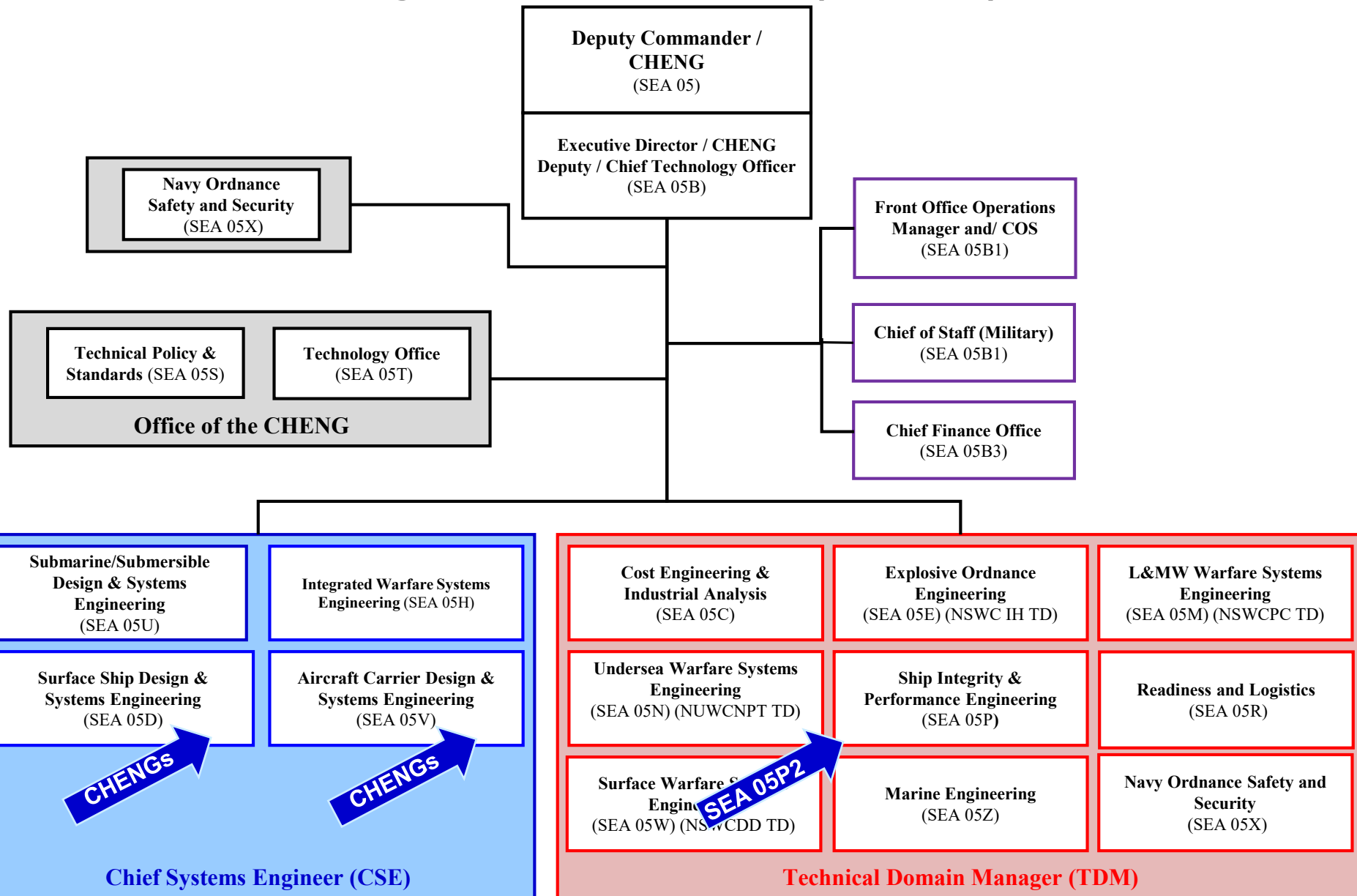
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OBJECTIVES

- Summarize evolving Naval Sea Systems Command (NAVSEA) organization and coating requirements:
 - Headquarters NAVSEA organization & objectives.
- Summarize **what's new** in NAVSEA nonskid and maintenance coating cost reduction strategies:
 - Publication of updated Standard Item 009-32.
 - Publication of significant update to the MIL-PRF-24667 conventional nonskid specification.
 - Publishing updated interior coating and decking specifications in process.
 - Publishing update to the TT-C-492 anti-sweat coating specification.
 - In-service demonstration of spray applied polysiloxane nonskid.
- Summarize **challenges** regarding recent listing of Oxsol 100 on California Proposition 65 list of carcinogens.



Naval Systems Engineering and Logistics Directorate (SEA 05)



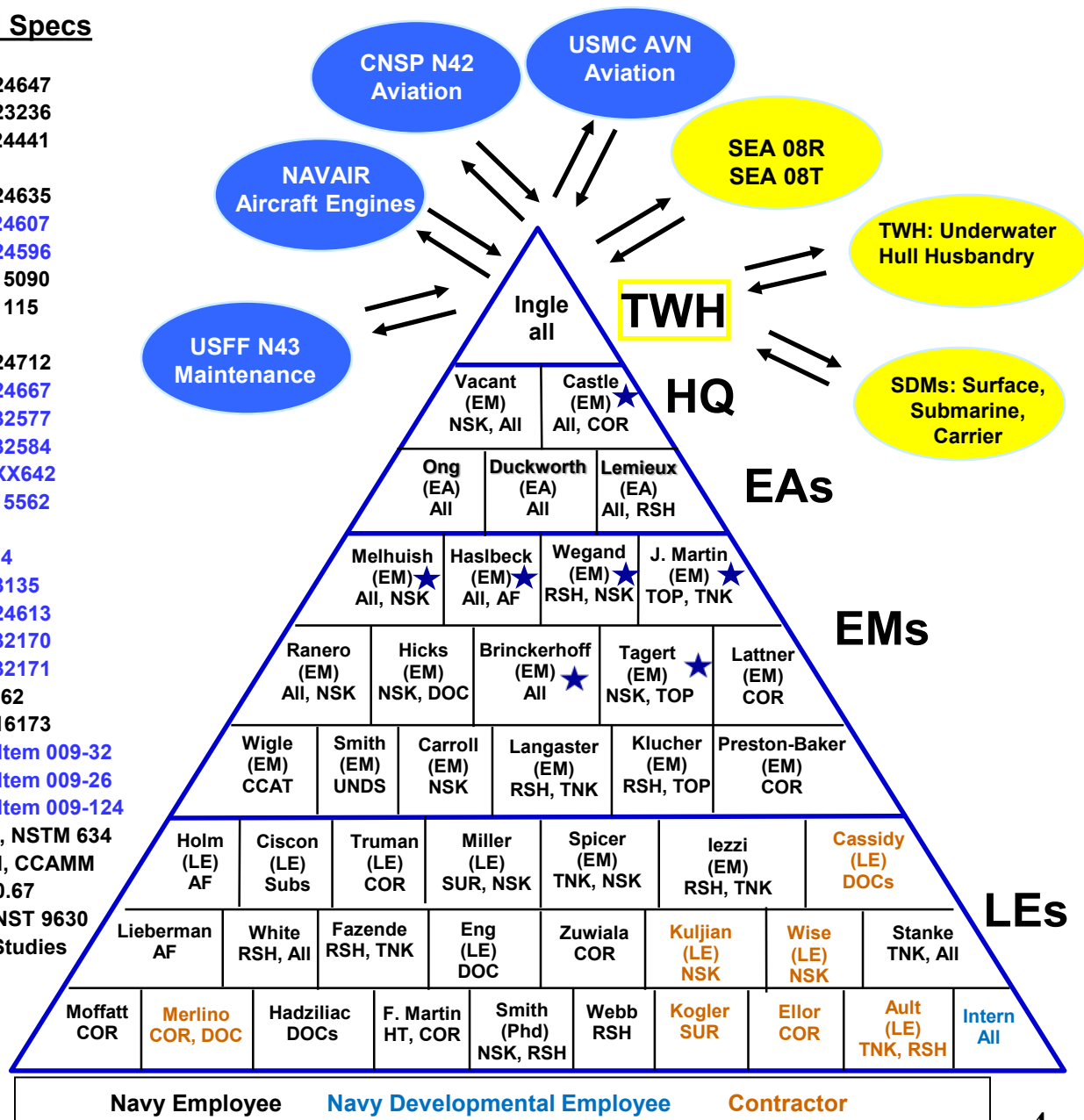
Technical Authority Pyramid - Coatings & Corrosion Control

Draft: Mar 2021

Code	Product	Related Specs
All	All Technical Products, Managerial	All
AF	Antifouling Coating Systems	MIL-PRF-24647
TNK	Tank Coatings, Epoxy Primers	MIL-PRF-23236 MIL-DTL-24441
PRM	Primers, Single Component	TT-P-645
TOP	Topside, Alkyds & Polysiloxanes	MIL-PRF-24635
INT	Interior Coatings (SEA 08)	MIL-DTL-24607 MIL-PRF-24596 MIL-DTL-15090 MIL-DTL-1115
HT	High Temp Coatings, Metallic	TT-P-28
PWD	Powder, Interior, Cosmetic	MIL-PRF-24712
NSK	Nonskid	MIL-PRF-24667 MIL-PRF-32577
DCK	Deck Coverings	MIL-PRF-32584 MIL-PRF-XX642 MIL-DTL-15562 DDD-C-95 MIL-D-3134 MIL-PRF-3135 MIL-PRF-24613 MIL-PRF-32170 MIL-PRF-32171
SUR	Abrasive blasting, surface prep	MIL-A-22262
SEL	Sealants & Preservatives	MIL-PRF-16173
DOC	Policy Documents	Standard Item 009-32 Standard Item 009-26 Standard Item 009-124
COR	Corrosion, PCOE	NSTM 631, NSTM 634 S636-MAN, CCAMM DODI 5000.67 NAVSEAINST 9630
RSH	Research & Development	Reports, Studies
UNDS	Regulations, Underwater hull	TBD



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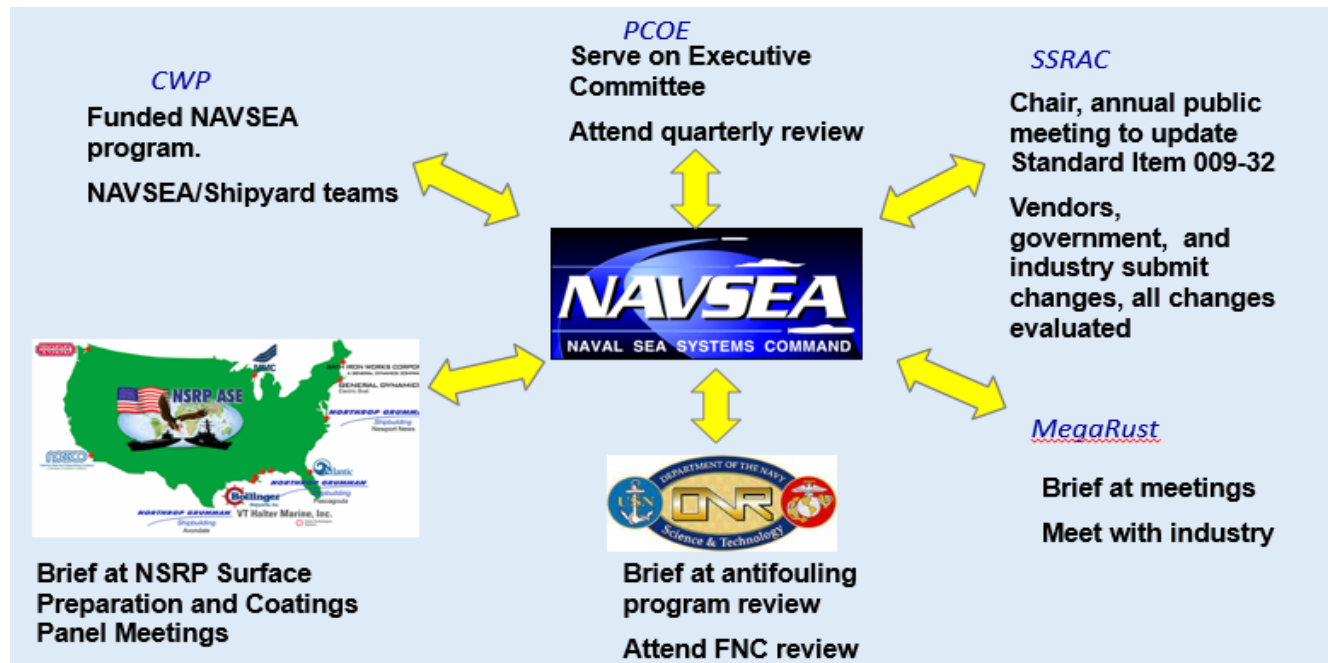


NAVSEA Strategic Business Plan

NAVSEA Strategic Business Plan 2018-2022, has three key mission priorities:

1. On-Time Delivery of Ships and Submarines.
2. Culture of Affordability.
3. Cybersecurity.

NAVSEA addresses these items through continual, ongoing interactions with shipbuilding and ship repair community:



What's new with Standard Item 009-32?

- Published FY-22, Change 1, Standard Item 009-32 on 21 Feb 2021 that includes relatively few technical and editorial changes.
 - No SSRAC meeting in 2020 so all changes based on Technical Authority.
 - All changes based on questions from SRF-JRMC and other field activities.
 - All changes vetted through HQ-NAVSEA (SEA 04X, SEA 05D, SEA 05P, SEA 05V, SEA 05U).

1. CREATED REQUIREMENTS FOR PCMS TILE INSTALLATION ON ALUMINUM, STEEL, AND GRP SUBSTRATES.

Previously: PCMS tile citations from Table 5 did not mention specific substrate material. Surface preparation requirements were for steel.

Added: New Lines in Table 2 for PCMS installation:
Steel Substrate – Lines 45 -52

Aluminum Substrate – Lines 75 -82 (cites new SSPC-SP 17)

GRP Substrate – Line 86



[SEA 05P2 validated new PCMS requirements with applicable HQ-NAVSEA codes.](#)

Published FY-22, Change 1, Update to Standard Item 009-32

2. CLARIFIED PARAGRAPH 3.7 REGARDING UNCOATED (OILED) TANKS.

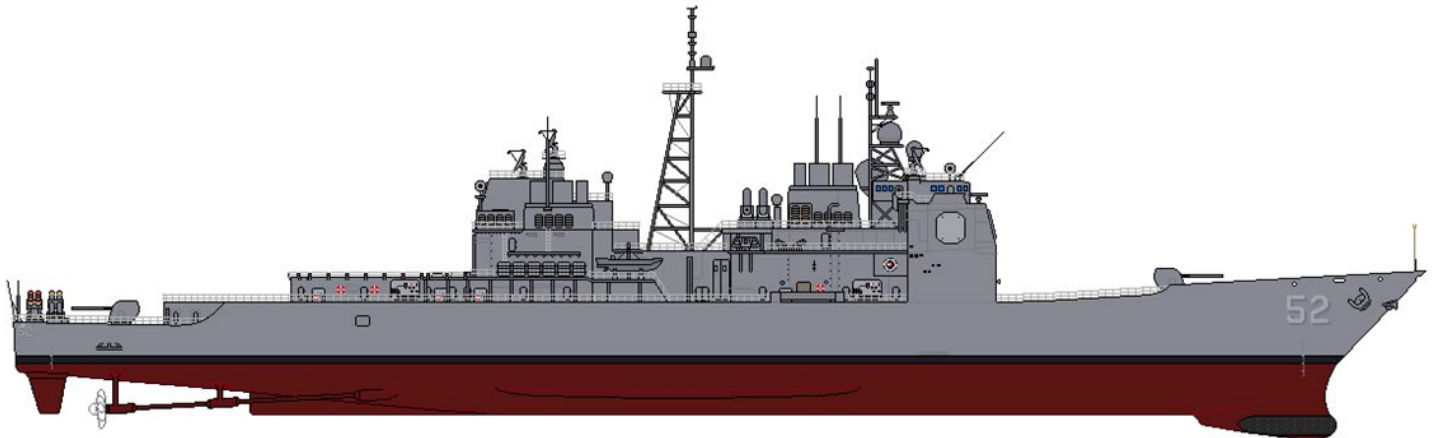
Previously: The paragraph 3.7 table of Critical Coated Areas included Note (65) that exempts ship's fuel tanks from coating requirement.

Removed: Note (65) from the paragraph 3.7 table to avoid confusion about whether or not uncoated tanks are Critical Coated Areas.

3. CLARIFIED THAT EMBARKED BOATS ARE TO USE GRAY ANTIFOULING.

Previously: Paragraph 3.1.22 requires embarked boats and craft to satisfy camouflage requirements, but Table 1, Line 19 invokes black coatings for embarked boats.

Modified: Table 1, Line 19 to require last coat of antifouling to be “gray” or as approved by the Supervisor. Note that a tradename “gray” antifouling was removed from Standard Item 009-32 in 2010.



Published FY-22, Change 1, Update to Standard Item 009-32

4. COMBINED LINES FOR TECHNICALLY SIMILAR CONDENSATION CONTROL COATINGS.

Previously: Table 5 Lines 3 and Line 5 both call out coatings that absorb moisture.

Combined: Table 5, Lines 3 and 5 into one line.

5. CREATED NEW REQUIREMENTS FOR COATING VEHICLE RAMPS AND VEHICLE STORAGE DECKS.

Previously: Table 2 had no requirements for interior nonskid surfaces on ramps and vehicle decks.

Created: New Table 2, Lines 20 and 20A for interior vehicle ramps and vehicle storage deck nonskids that require:

MIL-PRF-24667, Type I and Type V, Composition D
flight deck nonskid for use on interior of
LHA, LHD, LSD, and LPD.

New Note (83) that states:

Nonskid on vehicle ramps must be rolled
perpendicular to main axis of the ramp.

Welds must not be cross-rolled on vehicle ramps.



Published FY-22, Change 1, Update to Standard Item 009-32

6. CLARIFIED TERMS IN NOTE (10A).

Previously: Note (10A) used the term "qualified" that is not applicable to the cited MIL-DTL-24607 specification because it is a "First Article" document with no QPL.

Removed: Eliminated the term "qualified" from Note (10A).

7. CLARIFIED REQUIREMENTS FOR PREPARING WOOD SURFACES.

Previously: Table 2, Line 69 directed sanding without defining a sandpaper grit size.

Added: Note (71) to Table 2, Line 87, Column A to require workers to use 80- 120 grit sandpaper to prepare wood surfaces.

8. CLARIFIED REQUIREMENTS FOR SINGLE PACK POLYSILOXANE SYSTEM PRIMERS.

Previously: Table 2, Line 1 requires two coats of solvent-based epoxy primer at 4 – 8 mils DFT, one stripe coat, and then one coat of either:

Composition 1 (i.e., single pack polysiloxane) at 2 – 3 mils DFT

- or -

Composition 2 (i.e., two pack polysiloxane) at 5 – 8 mils DFT.

Created: New Table 2, Line 1 that deletes the second coat of solvent-based epoxy under the Composition 2 (i.e., two pack polysiloxane) at 5 – 8 mils DFT, and a new Line 1a that retains the two coats of primer under the Composition 1 (i.e., single pack polysiloxane) at 2 – 3 mils DFT.

9. EDITORIAL. Eliminated the Table 6, Line 1, Column B has a double comma between "TYPE IV" and "4 - 6 MILS".

Updates address concerns raised by NAVSEA and public without major policy changes.

Leadership Challenge

Improve Overall Nonskid Performance

- Mar 2017 – Senior NAVSEA / NAVAIR leadership task Flight Deck Readiness Working Group (FDRWG) to improve all aspects of flight deck nonskid service life. FDRWG includes:
 - SEA 05P2, NSWC-PD, NRL
 - SEA 21
 - Fleet Forces
 - NAVAIR technical community
 - Type Commander
 - USMC Aviation
- Nonskid must consistently achieve **required service life** while satisfying **all MIL-PRF-24667C performance requirements**.



Flight Deck Readiness Working Group tasked to improve nonskid service life and performance on all platforms.

Published MIL-PRF-24667D Specification Update

Utilize Type, Composition, Class, Application, and Grade to Define Nonskid

Proposed MIL-PRF-24667D Classification

MIL-PRF-24667, Type XI Peel & Stick, now MIL-PRF-24667C, and to become MIL-PRF-XX642 Type VIII

- ID characteristics
- impact resistance#
- flash point
- resistance to chemical solutions
- color
- condition in container
- pot life#
- fire resistance
- storage stability (accelerated and long-term)
- VOC content#
- HAP content
- metals content
- crystalline silica content
- toxicity
- directions for mixing and applying
- performance in-service#

14 May 2018

Distinguishing Requirements

- (1) resistance to wear
- (2) resistance to accelerated aging by light and water
- (3) resistance to accelerated corrosion
- (4) coefficient of friction*
- (5) appearance of dried coating
- (6) application properties
- (7) coverage
- (8) weight
- (9) flexibility
- (10) immersion resistance
- (11) cathodic protection compatibility
- (12) aggregate density
- (13) aggregate hardness
- (14) abrasion of arresting cable
- (15) color stability*
- (16) solar reflectance*
- (17) adhesion of the intermediate coat
- (18) pressure cycling
- (19)
- (20) resistance*
- (21) low profile*
- (22) drying time

* indicates new, or significantly modified

^ indicates alternate criteria

Application technology

Aggregate

Features

Number of components

Cure characteristics

Published MIL-PRF-24667D Specification Update

Utilize Type, Composition, Class, Application, and Grade to Define Nonskid

- MIL-PRF-24667D update published on 16 Feb 2021 and appeared in ASSIST on 8 Mar 2021. Update intended to provide requirements for nonskids to better satisfy Fleet customer needs including:

Types – Where and how the nonskid is installed (i.e., roller and spray options).

Compositions – What aggregate is in the nonskid.

Classes – Unique features or performance requirements.

Grades – Number of components in the nonskid.

Application – Temperatures at which the nonskid is installed.

1. Types – Eliminated five types and consolidated to distinguish between rollable vs. sprayable, standard vs. extended durability, and topside vs. submerged

- I – Standard durability, rollable deck coating
- II – Standard durability, sprayable deck coating
- III – Submerged applications, rollable
- IV – Submerged applications, sprayable
- V – Extended durability, rollable deck coating
- VI – Extended durability, sprayable deck coating

2. Compositions – No change

- D – Density-controlled abrasive deck system
- G – General use abrasive deck system
- L – Limited use aircraft carrier landing and run-out area deck system that is less abrasive to the steel arresting cable

INCH-POUND
MIL-PRF-24667D
16 February 2021
SUPERSEDING
MIL-PRF-24667C(SH)
w/INT. AMENDMENT 1
27 March 2018
MIL-PRF-24667C
22 May 2008

PERFORMANCE SPECIFICATION COATING SYSTEM, NONSKID, FOR ROLL OR SPRAY APPLICATION

This specification is approved for use by the Naval Sea Systems Command and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 **Scope.** This specification covers nonskid systems, coatings, and coverings for application to weather decks, flight decks, and hangar decks of aircraft carriers, surface combatants, and amphibious, auxiliary, and sealift ships, and submarines. Coatings are applied to steel, aluminum, and special hull treatment surfaces by spraying, rolling, or other application method as designated by the manufacturer of the nonskid system.

1.2 **Classification.** The nonskid systems covered by this specification are of the following types, compositions, classes, grades, and applications, as specified (see 6.2).

1.2.1 **Types.** The types of nonskid systems are as follows:

- a. Type I - Standard durability, rollable
- b. Type II - Standard durability, sprayable
- c. Type III - Submerged applications, rollable
- d. Type IV - Submerged applications, sprayable
- e. Type V - Extended durability, rollable
- f. Type VI - Extended durability, sprayable

1.2.2 **Compositions.** The compositions of nonskid systems are dependent on aggregate use and are categorized as follows:

- a. Composition D - Density-controlled abrasive deck system
- b. Composition G - General use abrasive deck system
- c. Composition L - Limited use aircraft carrier landing and run-out area deck system that is less abrasive to the steel arresting cable

1.2.3 **Classes.** The classes of nonskid systems are segregated by functionality as follows:

- a. Class 1 - Standard

Comments, suggestions, or questions on this document should be addressed to Commander, Naval Sea Systems Command, ATTN: SEA 05S, 1333 Isaac Hall Avenue, SE, Stop 5160, Washington Navy Yard, DC 20376-5160 or emailed to CommandStandards@navy.mil, with the subject line "Document Comment". Since content information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.dla.mil>.

AMSC N/A

FSC 8010

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Published MIL-PRF-24667D Specification Update

Utilize Type, Composition, Class, Application, and Grade to Define Nonskid

3. Classes – new category to identify various functionality

- 1 – Standard
- 2 – Color stable
- 3 – Low solar absorbent
- 4 – Resilient (for use where flexibility is required)
- 5 – Elastomeric substrate for submerged applications
- 6 – Low profile
- 7 - High Temperature

4. Grades – new category to identify number of components

- A – Single component coating
- B – Two component coating

5. Applications – new category to identify cure characteristics

- 1 – Standard cure
- 2 – Fast cure, temporary repair
- 3 – Low temperature

Note: MIL-PRF-24667D update intended to eliminate less durable nonskids. The current MIL-PRF-24667C, Type II nonskid specified for exterior walk areas to be replaced by MIL-PRF-24667D, Type I (roller applied) or Type II (spray applied) flight deck nonskids.

MIL-PRF-24667D

b. Class 2 - Color stable
c. Class 3 - Low solar absorbent (LSA)
d. Class 4 - Resilient (for use where flexibility is required)
e. Class 5 - Submerged elastomeric applications
f. Class 6 - Low profile
g. Class 7 - High temperature

1.2.4 Grades. The grades of the nonskid system are based on the number of components in the coating:
a. Grade A - One component coating
b. Grade B - Two component coating

1.2.5 Application. The applications for nonskid systems are organized by cure characteristics as follows:
a. Application 1 - Standard cure
b. Application 2 - Fast cure
c. Application 3 - Low temperature cure

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

COMMERCIAL ITEM DESCRIPTIONS

A-A-59982 - Application Spray Equipment for Nonskid Coatings
A-A-59984 - Mixer, Automated, Transportable, Nonskid Coating

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-5624 - Turbine Fuel, Aviation, Grades JP-4 and JP-5
MIL-D-16791 - Detergents, General Purpose (Liquid, Nonionic)
MIL-S-22698 - Steel Plate, Shapes and Bars, Weldable Ordinary Strength and Higher Strength: Structural
MIL-PRF-23699 - Lubricating Oil, Aircraft Turbine Engine, Synthetic Base, NATO Code Numbers: O-152, O-154, O-156, and O-167
MIL-PRF-24385 - Fire Extinguishing Agent, Aqueous Film-Forming Foam (AFFF) Liquid Concentrate, for Fresh and Sea Water
MIL-PRF-32177 - Cleaning Compound, Nonskid
MIL-PRF-83282 - Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Metric, NATO Code Number H-537

2

Nonskid manufacturers contacted via SEA 05P2 e-mail on 10 Mar 2021 that requested requalification requests.

Published MIL-PRF-24667D Specification Update Requires Improved CoF Measurement Methodology

NEW METHOD: MIL-PRF-24667D nonskid specification requires flight deck nonskid Coefficient of Friction (CoF) to be measured when a nonskid is qualified using current **sliding block for static CoF** and new **μ-deck rotating ball device for dynamic CoF**:

- CoF measured between NAVSEA standard rubber ball (NAVSEA DWG NO. 8418020) based on aircraft tire rubber composition and nonskid surface.
- Rotating ball method measures consistent, dynamic CoF over 360 degrees in one measurement.
- Based on commercial pin-on-disk approach.
- Commercially available unit under tradename μ-Deck from Vision Point Systems since 2008

- CoF testing to be conducted during material qualification:

TABLE III. Static COF

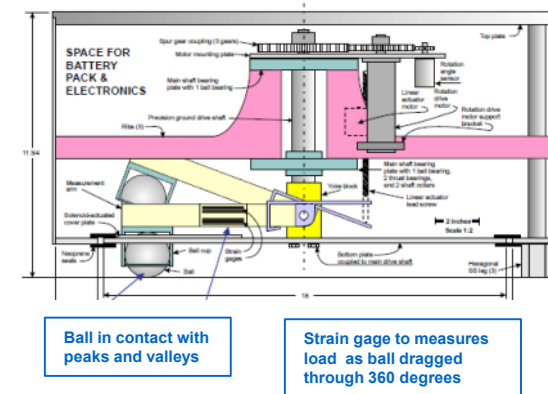
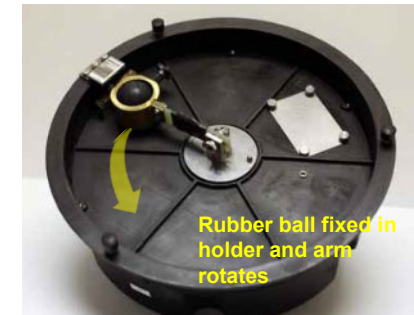
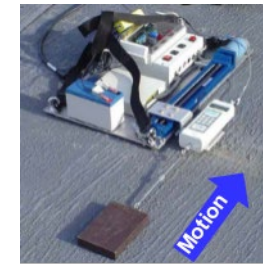
	Minimum value	
	Dry	Wet
Conditioned		
Types I through VI	0.95	0.90
Worn		
Types I through VI	0.90	0.85

Paragraph 3.4.2 μ-Deck Dynamic CoF

Dry: 1.4

Wet: 1.1

No requirement to validate as-applied nonskid CoF.

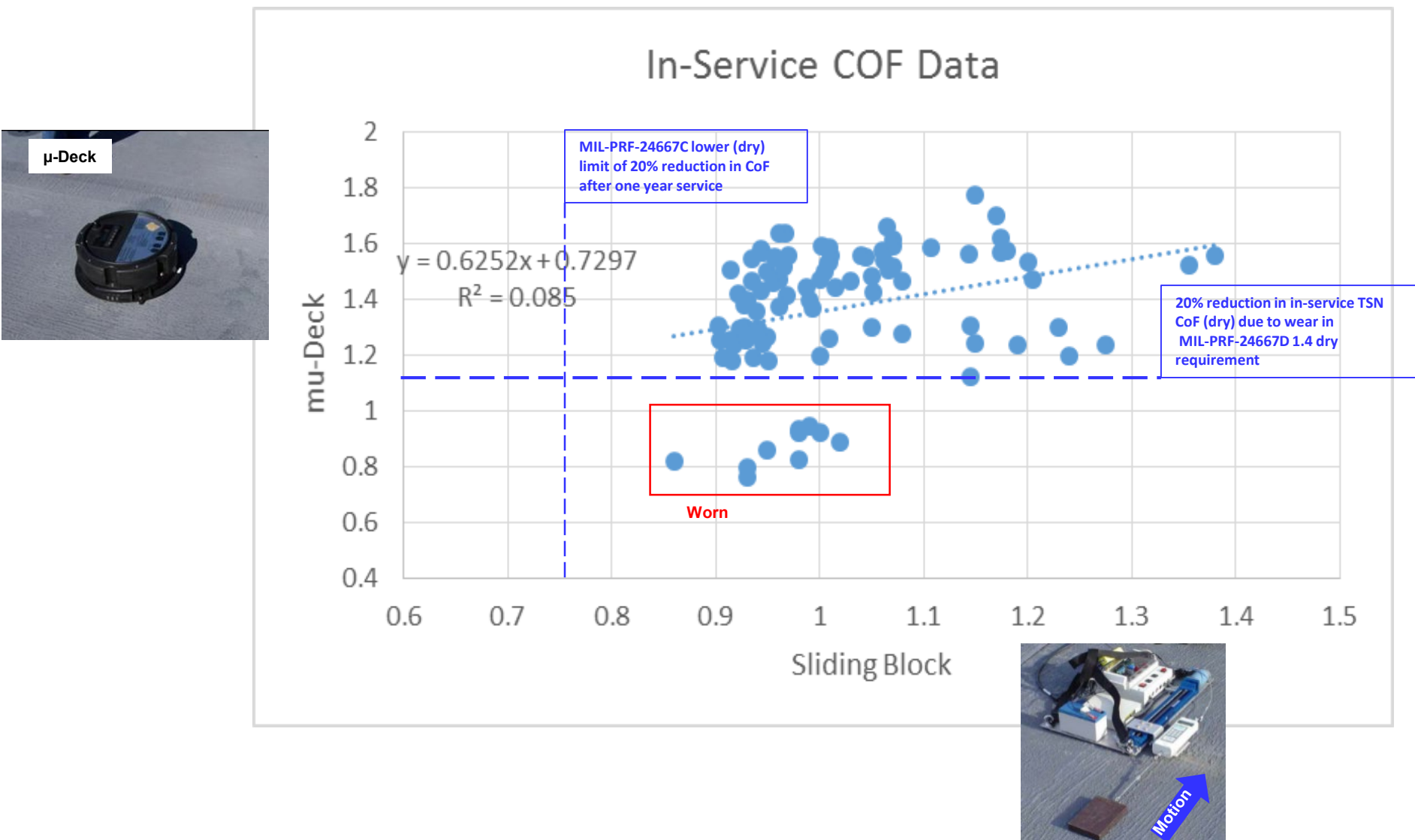


SYSTEM IMPROVEMENTS: Automated, portable, reproducible data across broad temperature range.

- Affordable using COTS parts design.
- Automated calibration (may need plate standards and strain gage validation).

NAVSEA transitioning new rotating ball technology to standard practice in MIL-PRF-24667D but need fleet input.

Published MIL-PRF-24667D Specification Update MIL-PRF-32577 Already Requires Improved CoF Measurement Methodology



mu-Deck discriminates between acceptable and unacceptable CoF more clearly than sliding block.

Published MIL-PRF-24667D Specification Update

Shipboard Qualification of Composition D Nonskid

- MIL-PRF-24667C currently requires all nonskid materials to be qualified on a CVN flight deck.

Composition G – MIL-PRF-24667C

- a. Wear-through showing the primer or steel deck;
- b. ASTM D660 checking rated less than 8;
- c. ASTM D661 cracking rated less than 8
- d. Breaking (flaking);
- e. Loss of adhesion (peeling);
- f. COF values less than 80 percent of the initial value;
- g. Other deficiency which would adversely affect its performance.

Composition D – MIL-PRF-24667D

FLIGHT DECK NONSKID QUALIFICATION ON LHA/LHD

- Retained current a.- g. performance criteria.
- Maintained Composition D density requirements.
- Added new cyclic heat resistance requirements.
- Modified service test to 18 months.

Fixed wing



Fixed and rotor wing

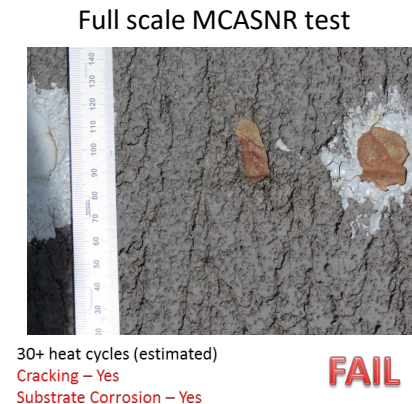
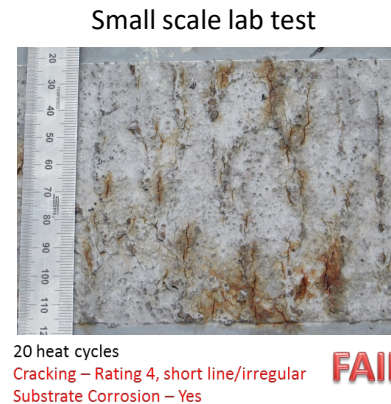
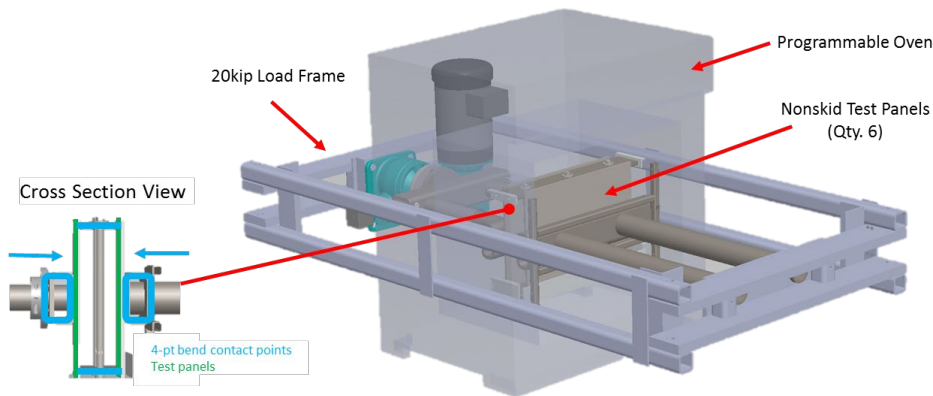


Nonskid materials experience different challenges on CVN and LHA/LHD and QPD must reflect all ship classes.

Published MIL-PRF-24667 Specification Update

Heat Resistance

- Add performance tests for heat resistant nonskids. Current epoxy nonskid coatings are not designed to survive heat from exhaust gas impingement on deck.
 - FY-18, Change 1, Standard Item 009-32 eliminated use of MIL-PRF-24667C, Type VIII low temperature cure nonskid on LHA/LHD flight deck.
 - New requirements for heat-resistant nonskid to be based on the small-scale heat and deck flexure tests developed by NRL as follows:
 1. Heat flexure testing to be required for Composition D nonskid.
 2. Age nonskid - 300 hours of UV degradation.
 3. Flex nonskid under simulated exhaust heat at 400°F - 50 deflections in 4-pt bend test while at elevated temperatures (15 min hold cycle).
 4. Stress nonskid with corrosive conditions - 150 hours of salt spray.



Updated specification performance requirements based on successful products demonstration on LHA/LHD.

Update to MIL-DTL-24607 & MIL-PRF-24596 Updates In Process

Fleet Need for New Interior topcoat colors

- MIL-DTL-24607 & MIL-PRF-24596 updates in process and documents released for Specification Review Board (SRB) review in May 2020.
- Updated to address formulas citing ingredients no longer available and to update colors.
- Fleet had been requesting to use “bright white” in place of soft white to lighten spaces and increase visibility.
- SEA 05P2 noted need for flat, dark blue as per NSTM 631 Table 631-8-11, Note 9:
“Pastel blue, color number 25526, MIL-DTL-24607 shall be used on bulkheads in CIC spaces and outboard operations and communications spaces with Broad Band Blue Operation Lighting systems. Overheads shall be *insignia blue*, color number 35044.”
- SEA 05P2 / NRL worked with Navy supply system and paint suppliers to determine sales volumes for cited colors. Six of the original eleven colors showed very low sales volume.
 - Sun Glow
 - Rosewood
 - Yellow Gray
- Updates to MIL-DTL-24607 & MIL-PRF-24596 resulted in removal of six colors and addition of two.

[MIL-DTL-24607 & MIL-PRF-24596 in final NAVSEA review process, if interested contact SEA 05P2](#)

Streamlined Interior Topcoat Colors

- Color reduction in interior alkyd specifications reduces logistics and waste.

Rosewood #22519	Yellow Gray #26400	Sunglow #23697	Clipper Blue #24516
Pastel Green #24585	Pastel Blue #25526	Bulkhead Gray #26307	Beach Sand #22563
Pearl Gray #26493	Green Gray #26496	Soft White #27880	

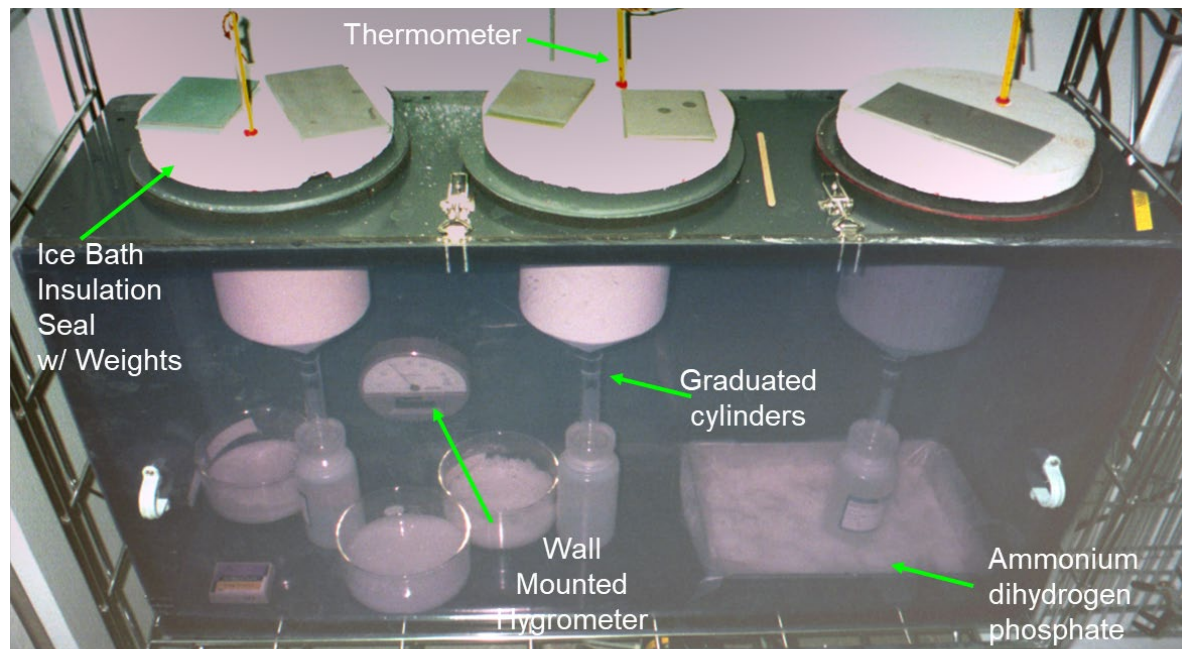


Pastel Green #24585	Pastel Blue #25526	Bulkhead Gray #26307	Beach Sand #22563
Insignia Blue #35044	Bright White #27925	Soft White #27880	

Update to TT-C-492 Specification In Process

Was for Anti-sweat Coatings, but Expanded to Include “Insulation” Coatings

- TT-C-492, Coating Compound, Paint Anti-sweat last amended in 1977.
- Current TT-C-492C cites archaic Federal and ASTM test methods.
- Current TT-C-492 not cited in Standard Item 009-32, but condensation control coatings cited by tradename – **not in accordance with CNRMC policy.**
- TT-C-492 does not, and will not have a qualified product list, but rather will be a “first article” specification.



TT-C-492 specification update in process with NSWC-PD, Code 613 as project lead.

TT-C-492 Specification Update In Process

1.2.1 Types

- Type I – maximum VOC content of 50 grams per liter (0.4 pounds per gallon)
- Type II – maximum VOC content of 150 grams per liter (1.3 pounds per gallon)
- Type III – maximum VOC content of 250 grams per liter (2.1 pounds per gallon)

1.2.2 Classes

- Class 1 – thermal conductivity less than or equal to 0.05 watts/(meter × kelvin)
[0.03 BTU/(hour × foot × °F)]
- Class 2 – thermal conductivity greater than 0.05 watts/(meter × kelvin)
[0.03 BTU /(hour × foot × °F)] but less than or equal
to 0.20 watts/(meter × kelvin) [0.116 BTU /(hour ×
foot × °F)]
- Class 3 – thermal conductivity greater than 0.20 watts/(meter × kelvin)
[0.116 BTU /(hour × foot × °F)]
- Class 4 – prevent condensation by water absorption or water vapor absorption

1.2.3 Grades

- Grade A – prevent condensation for a minimum of 96 hours
- Grade B – prevent condensation for a minimum of 24 hours
- Grade C – prevent condensation for a minimum of 8 hours

1.2.4 Applications

- Application A –maximum final DFT greater than 3.2 millimeters ($\frac{1}{8}$ inch)
- Application B – maximum final DFT equal to or less than 3.2 millimeters ($\frac{1}{8}$ inch)

Updates include requirements for both condensation control coatings and “insulation” coatings.

TT-C-492 Specification Update In Process

TABLE III. Quantitative requirements.

Quantitative property	Classification	Standard	Requirements	Test methods	Conformance testing
Condensation	All	----	3.4.1	4.5.3	No
Dry time	All	----	3.4.2	4.5.4	Yes
Sag resistance	All	ASTM D4400	3.4.3	4.5.5	Yes
Knife adhesion	All	ASTM D6677	3.4.4	4.5.6	Yes
Thermal conductivity	Class 1 Class 2 Class 3	ASTM C518	3.4.5; Table IV	4.5.7	No
Flash point	All	ASTM D3278 ASTM D6450	3.4.6	4.5.8	Yes
VOC	All	40 CFR 60, appendix A-7, method 24	3.4.7	4.5.9	Yes
Mold/mildew resistance	All	ASTM D3273	3.4.8	4.5.10	No
Surface flammability	Application A	IMO A.653	3.4.9.1.1	4.5.11.1.2	No
Smoke density	Application A	ASTM E662	3.4.9.1.2	4.5.11.1.3	No
Fire gas toxicity	Application A	T9070-AK-DPC-010/078-1	3.4.9.1.3	4.5.11.1.4	No
Flashover	Application A	ISO 9705-1	3.4.9.1.4	4.5.11.1.5	No
Flame spread index	Application B	ASTM E162	3.4.9.2.1	4.5.11.2.2	No
Smoke density	Application B	ASTM E662	3.4.9.2.2	4.5.11.2.3	No
Hazardous emission	Application B	----	3.4.9.2.3	4.5.11.2.4	No
Resistance to ignition	All	----	3.4.10	4.5.12	No

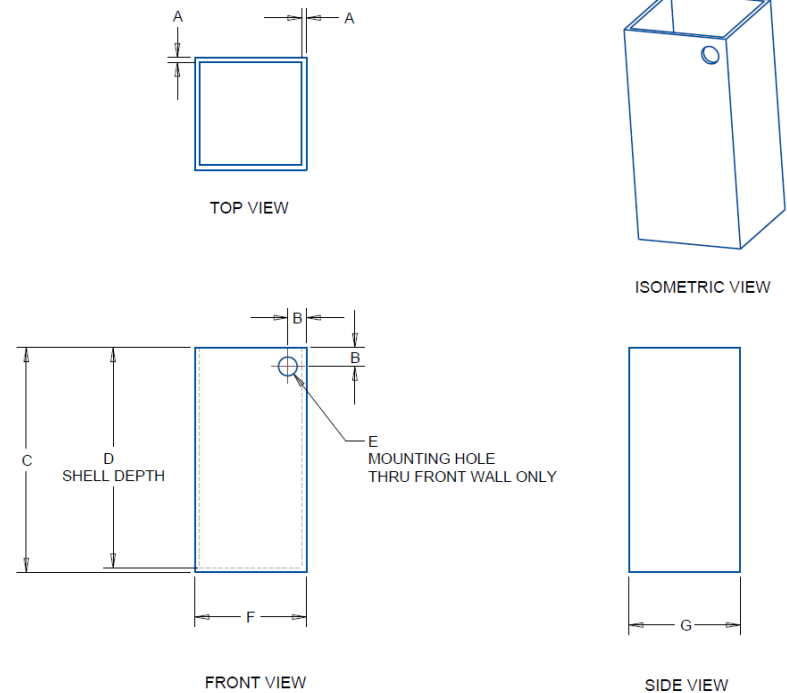
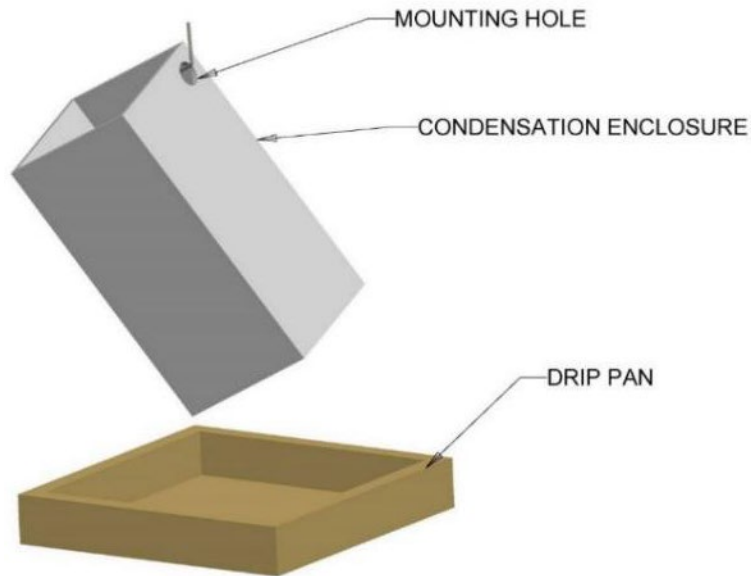
Red text is a legacy requirement. However, the specific methodology was revised.

Updates include requirements for both condensation control coatings and “insulation” coatings.

TT-C-492 Specification Update In Process

NEW REQUIREMENTS: Updated TT-C-492 uses a new condensation testing apparatus that is easier to fabricate, more realistic to coat, and that can be fabricated from steel, aluminum, or copper to address specific applications.

Enclosure will be coated and filled with ice and water.



- Pass/fail based on any accumulated condensation at specified time intervals (8 hrs, 24 hrs, and 90 hrs).
- Corners and flat sides to represent bulkheads.
- Expose to “normal” shipboard conditions like 60-70 Fahrenheit with relative humidity of 70 to 80%.

Specification Review Board (SRB) process ended on 11 Mar 2021, NAVSEA adjudicating comments.

Demonstrate Spray Applied Polysiloxane Nonskid and Enhanced Surface Preparation on Aluminum Flight Deck

ISSUE: OSR team observe pitting on aluminum class flight deck during nonskid removal/replacement.

- Pits up to 2 mm (79 mils) depth.
- Nonskid removal and surface preparation using stainless steel shot could cut into aluminum flight deck.

Need to identify nonskid removal and surface preparation process that does not appreciably wear deck, but prepares surface effectively to support extended nonskid service life.



REQUIREMENTS: FY-22, Change 1, Standard Item 009-32, Table 2, Lines 55 & 56 require application of either MIL-PRF-24667C, Type I or Type V nonskid on flight deck surface preparation in accordance with:

"THOROUGH ABRASIVE BLAST CLEANING OF NON-FERROUS METALS, SSPC-SP 17 USING GARNET, ALUMINUM OXIDE, CRUSHED GLASS, OR STAINLESS STEEL SHOT - OR - WATERJETTING TO NACE/SSPC-SP WJ-2."

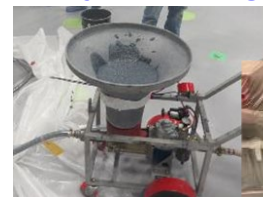
Abrasive blasting will correct areas with pitting, but repeated blasting every few years will remove too much aluminum over the 20 year service, potentially compromising the inherently thin aluminum flight deck.

NEW TECHNOLOGY: Spray applied the MIL-PRF-24667 qualified polysiloxane nonskid over two coats of qualified primer to maximize overall flight deck nonskid system service life.

Demonstrated removal of nonskid using ultrahigh pressure waterjet operating at <30,000 psi.

Demonstrated wet abrasive blasting on 100% of flight deck to provide uniform surface profile to maximize primer adhesion and apply two coats of primer to maximize nonskid system corrosion control performance.

Goal is greater than 5 years of nonskid service.

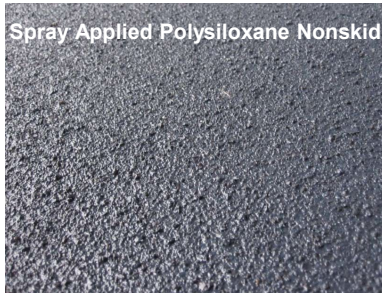


Installed spray applied polysiloxane nonskid over 100% abrasive blasted deck to maximize aluminum flight deck nonskid service life in Oct 2019.

Spray Applied Polysiloxane Nonskid

Coefficient of Friction Can Exceed Requirements for Roller Applied Nonskid Over Time

- Spray applied polysiloxane nonskid Coefficient of Friction (CoF) measured using μ -Deck Meter in as-applied condition and after in-service operational periods on ships. Baseline requirements are for CoF measured using μ -Deck Meter as appear in the MIL-PRF-32577 Thermal Spray Nonskid (TSN) specification.

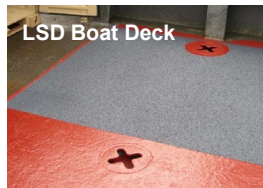


As Applied Flight Deck Nonskid CoF

Spray applied polysiloxane nonskid CoF – 1.37-1.59

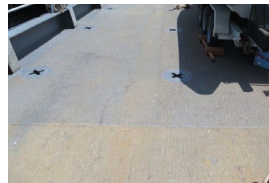
Roller applied MIL-PRF-24667, Type I and Type V epoxy nonskid CoF – 1.35-1.45

- In Service CoF of spray applied polysiloxane nonskid measured after shipboard operations.

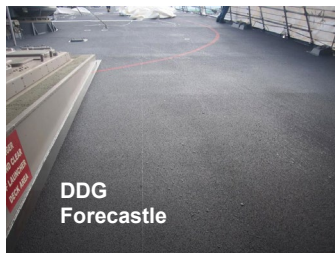


CoF – 1.37

9 months



CoF – 1.29



CoF – 1.46 to 1.52

26 months



CoF – 1.29 to 1.49

51 months



CoF – 1.34 to 1.50

CoF of spray applied polysiloxane nonskid on in-service steel decks maintaining CoF and service life limited by mechanical damage.

Regulatory Issue

Oxsol 100 Defined as Carcinogen in California

ISSUE: Oxsol 100 or parachlorobenzyltrifluoride (PCBTF), an exempt solvent used in Navy coatings, was listed under California Proposition 65 as a carcinogen based on a 2018 study from the National Toxicological Program.

South Coast Air Quality Management District, (SCAQMD) proposing to eliminate exempt solvent status.

NAVSEA SPECIFICATIONS

THAT MAY BE AFFECTED: Performance Specifications like MIL-PRF-24635.

Interior Alkyd Specifications like MIL-DTL-24607.

TABLE I. Color name and FED-STD-595 color number.

Ingredients ^{1/} (pounds)	Soft white 27880	Bulkhead gray 26307	Rosewood 22519	Pastel green 24585
Chlorinated alkyd resin ^{2/}	468.71	465.31	468.70	473.80
Titanium dioxide ^{3/}	214.82	211.38	212.91	215.23
Magnesium silicate ^{4/}	74.94	73.85	74.38	75.19
Aluminum trihydrate ^{5/}	195.94	194.52	195.94	198.07
Calcium borosilicate ^{6/}	98.44	97.72	98.43	99.50
Calcium metaborate ^{7/}	95.59	94.90	95.59	96.63
PCBTF ^{8/}	147.83	146.76	147.83	149.44
Paint thinner ^{9/}	35.55	35.30	35.55	35.94
Thixatrop ^{10/}	13.87	13.76	13.86	14.01
Dispersant ^{11/}	3.92	3.89	3.91	3.96
Wetting agent ^{12/}	3.07	3.04	3.07	3.10
Anti-skinning agent ^{13/}	2.91	2.88	2.91	2.94
Cobalt drier ^{14/}	0.92	0.91	0.92	0.93
Zirconium drier ^{15/}	0.91	0.90	0.91	0.92
Yellow oxide paste ^{16/}	---	22.76	20.30	3.54
Lamp black paste ^{17/}	---	8.40	0.39	---
Red oxide paste ^{18/}	---	---	4.62	0.58
Phthalo green paste ^{19/}	---	---	---	1.44
Organic yellow paste ^{20/}	---	---	---	1.77
Phthalo blue paste ^{21/}	---	---	---	0.26
Totals	1357.40	1376.28	1380.22	1377.24

TABLE I. Color name and FED-STD-595 color number - Continued.

NOTES:	
1/	Formulas make approximately 100 gallons of paint.
2/	Becksol 91169-00, Reichold, Inc., Research Triangle Park, NC
3/	ASTM D476, Types I or II
4/	Onyacarb 3, OMYA Inc., Proctor, VT
5/	Aluminum trihydrate, SB-632, J.M. Huber, Edison, NJ
6/	CW-2230, Halox Pigments, Hammond, IN
7/	Calcium metaborate, BuLabFlame Block BL-381 Buckman Laboratories, Memphis, TN
8/	Oxsol 100®, Occidental Chemicals Corp., Dallas, TX (Oxsol 100(r) was used for this formulation)
There are chemically identical alternatives available from other manufacturers.)	
9/	Aromatic Naphtha, Ashland Chemicals, Columbus, OH
10/	Thixatrol SR, Elementis, Hightstown, NJ
11/	Spurso, OMG Americas, Cleveland, OH
12/	Anti-Terra 204, Byk-Chemie USA, Wallingford, CT
13/	Skinco #2, OMG Americas, Cleveland, OH
14/	Cobalt Neodecanoate(12%), OMG Americas, Cleveland, OH
15/	Zirconium Neodecanoate(18%), OMG Americas, Cleveland, OH
16/	5750V, UCD, Division of Rohm & Haas, Lansing, IL
17/	1625V, UCD, Division of Rohm & Haas, Lansing, IL
18/	6080V, UCD, Division of Rohm & Haas, Lansing, IL
19/	5150V, UCD, Division of Rohm & Haas, Lansing, IL
20/	5696V, UCD, Division of Rohm & Haas, Lansing, IL
21/	4800V, UCD, Division of Rohm & Haas, Lansing, IL
22/	7949V, UCD, Division of Rohm & Haas, Lansing, IL
23/	6012V, UCD, Division of Rohm & Haas, Lansing, IL

PCBTF

SEA 05P2 supported the American Coatings Association (ACA) during a virtual public meeting on 11 Feb 2021 with South Coast Air Quality Management District (SCAQMD) by explaining that PCBTF is used in 64% of NAVSEA's coating specifications.

[De-listing of PCBTF as an exempt solvent in California could adversely affect ability of U.S. Navy to coat ships in San Diego, CA.](#)

Conclusions

- NAVSEA goal is to support NSRP SPC panel by developing new materials and processes to extend service life and reduce costs.
- NAVSEA published FY-22, Change 1 update to Standard Item 009-32 on 21 Feb 2021.
- NAVSEA published update to conventional nonskid specification MIL-PRF-24667D on 16 Feb 2021.
- NAVSEA publishing update to TT-C-492 condensation control coating.
- NAVSEA demonstrating new coatings and processes on aluminum flight deck.
- NAVSEA working with ACA, NSRP SPC and waterfront community to address evolving regulatory issues.



QUESTIONS?

Additional Specification Updates

- **MIL-PRF-16173 expansion of class definitions (temporary vs. persistent, hard vs. soft, solvent- vs. steam-removable, etc.).**
- **TT-P-28J revision out for industry comments on 21 May 2020**
 - **Liquid paints no longer limited to aluminum-containing.**
 - **New class for TSN topcoat.**
- **MIL-PRF-32584 found to have significant issues. Interim amendment planned by end of FY-21.**
- **Draft MIL-PRF-XX642 undergoing major revision. Electrical grade mat and sheet to be removed (i.e., SEA 05Z33 cognizance).**

[NSRP SPC team invited to intended to contact SEA 05S to be added to review team for specifications.](#)