NAVAL SEA SYSTEMS COMMAND
What's New in NAVSEA Coatings?

National Shipbuilding Research Program

July 2024

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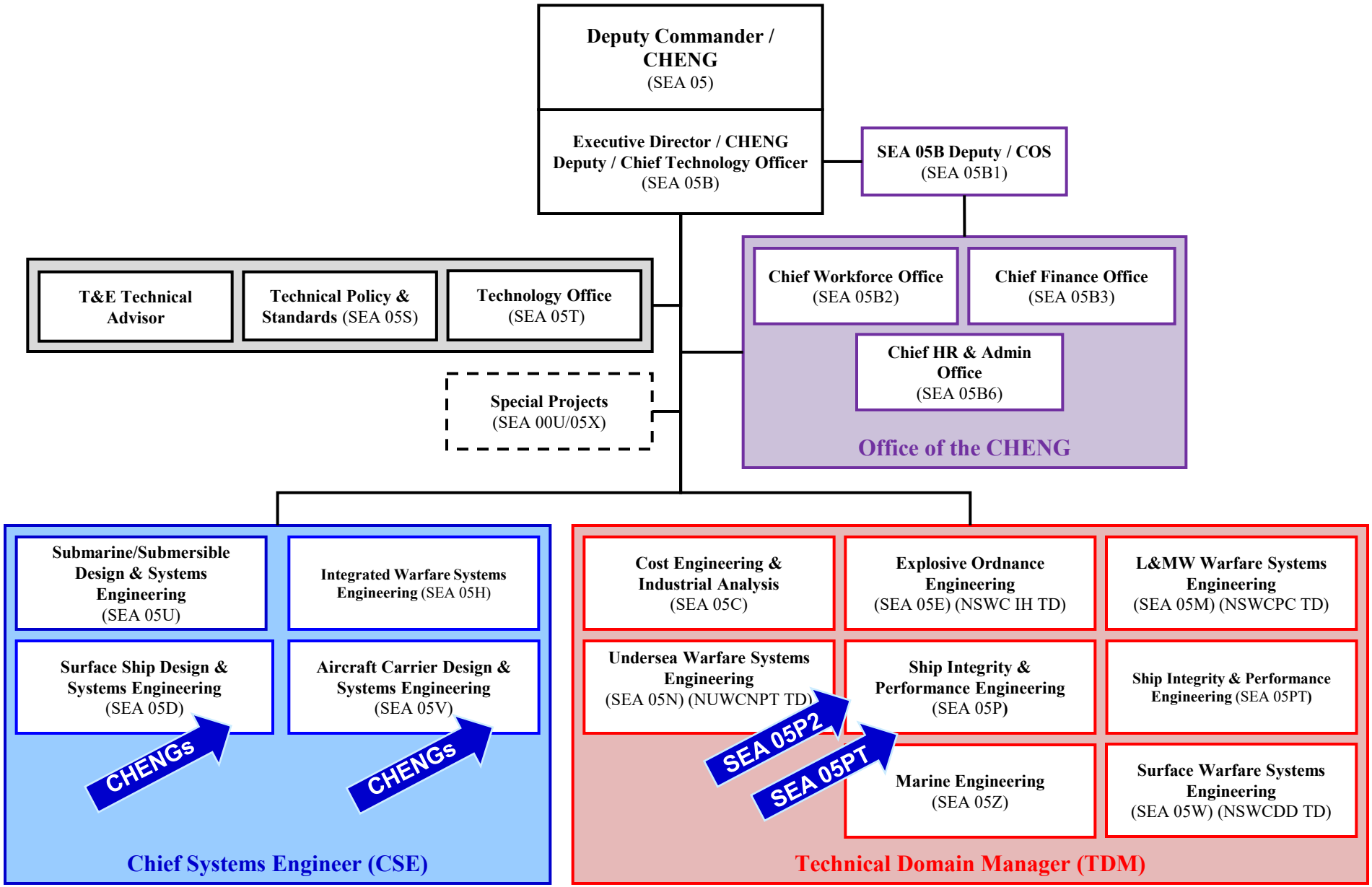
SEA 05P2

OBJECTIVES

- Summarize evolving Naval Sea Systems Command (NAVSEA) organization and coatings requirements team:
  - •• Headquarters NAVSEA organization & objectives.
- Summarize what's new in NAVSEA coatings and nonskid requirements:
  - •• Update to Standard Item 009-32 and working groups on key issues.
  - •• Qualified TSN color topping to TT-P-28J.
  - •• Publishing update to MIL-PRF-22262C abrasive blast media specification.
  - •• Publishing update to MIL-PRF-16173F preservative specification.
  - •• Published update to TT-C-492D.
- Summarize new developments and technologies to increase coatings service life and reduce application costs:
  - •• Planned changes to shelf-life requirements based on Painting Center of Excellence (PCoE) program conducted by Naval Research Laboratory (NRL).
  - •• Expanding Thermal Spray Nonskid (TSN) to smaller ships.
    - NRL demonstration testing.
  - •• Investigating underlayment for use under exterior walking area nonskid.

Naval Systems Engineering Directorate (SEA 05)

Draft: Apr 2024



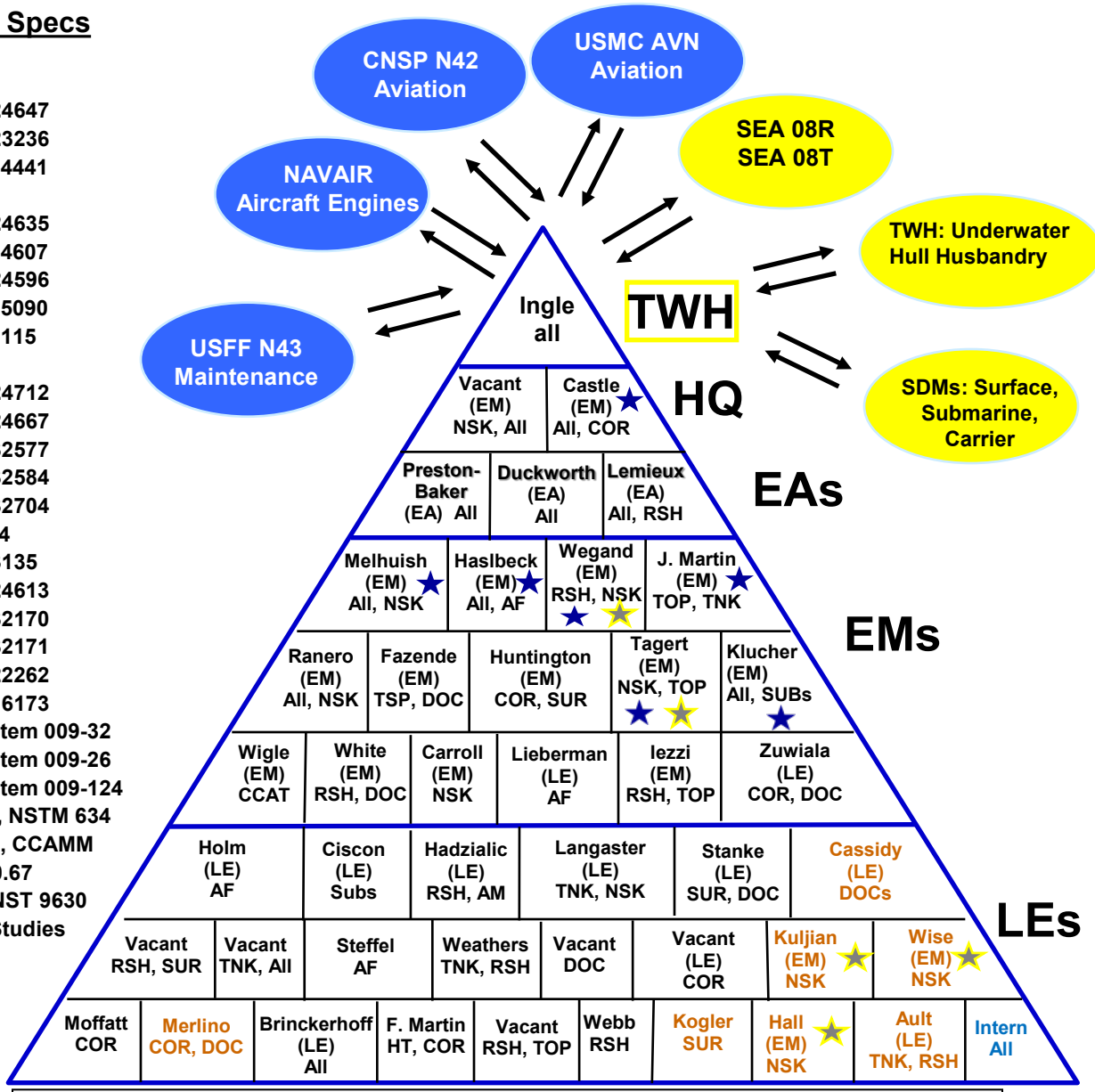
Technical Authority Pyramid - Coatings & Corrosion Control

Draft: Apr 2024

Code	Product	Related Specs
All	All Technical Products, Managerial	All
AM	Additive Manufacturing	Multiple
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-32704
		MIL-D-3134
		MIL-PRF-3135
		MIL-PRF-24613
		MIL-PRF-32170
		MIL-PRF-32171
SUR	Abrasive blasting, surface prep	MIL-PRF-22262
SEL	Sealants & Preservatives	MIL-PRF-16173
DOC	Policy Documents	Standard Item 009-32
		Standard Item 009-26
		Standard Item 009-124
		NSTM 631, NSTM 634
		S636-MAN, CCAMM
COR	Corrosion, PCOE	DODI 5000.67
		NAVSEAINST 9630
RSH	Research & Development	Reports, Studies
UNDS	Regulations, Underwater hull	TBD

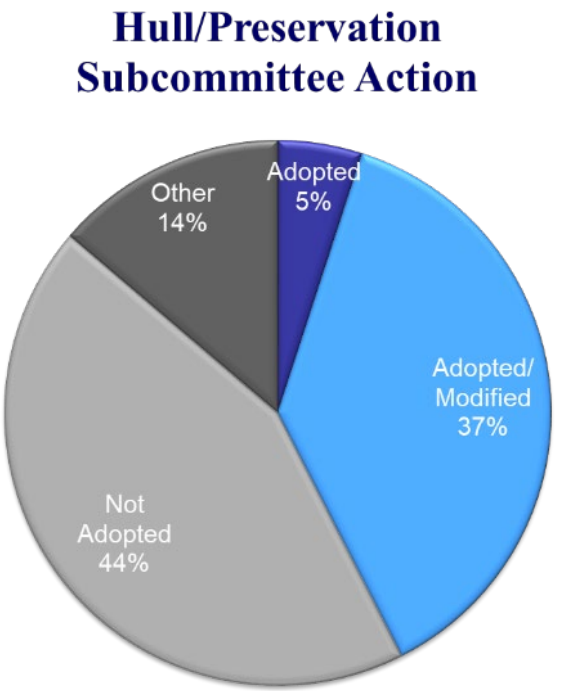
★ Delegated signature authority

★ NAVSEA-approved Technical Representative



What's new with Standard Item 009-32?

- **5 - 8 June 2023, completed in-person, Standard Specifications for Ship Repair and Alteration Committee (SSRAC) meeting in Newport News, VA.**
- **12 Mar 2024, published FY-25 update to Standard Item 009-32.**
- **78 total proposals addressed:**
  - **4 Adopted**
  - **30 Adopted/Modified**
  - **35 Not Adopted**
  - **9 Other (i.e., open action items and Technical Warrant Holder directed changes)**
  - **All changes vetted through established HQ-NAVSEA (i.e., SEA 04X, SEA 05D, SEA 05P, SEA 05PV, SEA 05U, SEA 05Z, and SEA 08) review process and all comments were incorporated.**



Changes to FY-25 Standard Item 009-32 vetted using established HQ-NAVSEA review process.

What's new with Standard Item 009-32?

- **"Top Five" updates to FY-25, Change 1, Standard Item 009-32:**

1. **Added "Freeboards (Excluding Aircraft Carriers)" to paragraph 3.7 as Critical Coated Areas (CCA) on both steel and aluminum substrates.**

2. **Added areas receiving PCMS tile above flight deck on aircraft carriers to paragraph 3.7 as CCA.**

3. **Required exhaust spaces and exhaust trunks to be coated with MIL-PRF-23236, Type VII, Class 19 coatings that are qualified for service at up to 500°F**

4. **Updated BLISS caps coating requirements to reflect the most current, technically acceptable SSPC-SP 16 "Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals" using MIL-A-22262 qualified media or Al_2O_3.**

5. **Required ultrahigh solids coating in LCS 2 Variant amah voids after abrasive blasting to an SSPC-SP 17 "Thorough Abrasive Blast Cleaning of Non-ferrous Metals" using MIL-A-22262 qualified media or Al_2O_3.**

FY-25 Changes to Standard Item 009-32 address TCC and reduce life cycle maintenance costs.

What's New With Standard Item 009-32?
Defined Surface Ship Topsides as Critical Coated Areas

ISSUE: From the late 1980s to 2005, "Freeboard" was cited in Standard Item 009-32 as a CCA.

- CCA does not alter the coating application requirements, but requires additional government oversight (e.g., signing QA/QC checkpoints).

- In 2005, both the Surface and Air Type Commanders (TYCOMs) recommended removing "Freeboard" from the Standard Item 009-32 CCA list, due to coating task cost and ability of ship's force to inspect and touch-up freeboard coatings.

- FY-07 Standard Item 009-32, published on 14 Jul 2005, DID NOT cite freeboard as CCA, and this remained the case until 2024.

RESULT: Leadership goal to reduce topside corrosion resulted in update to FY-25 Standard Item 009-32 to enhance oversight of freeboard coating installation on steel and aluminum substrates:

- FY-25, Change 1, Standard Item 009-32, includes the following in the CCA list appearing in paragraph 3.7:

  "Freeboards (excluding Aircraft Carriers)"

  - and -

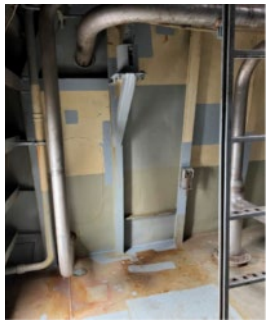
  "Aircraft carrier areas above the flight deck receiving PCMS"

Changes provide highest level of government oversight for coating application to ensure compliance with coating installation requirements and minimize topside corrosion risk.

What's New With Standard Item 009-32?
Required Heat Resistant Coatings in DDG 51 Class Intake/Uptake Spaces

ISSUE: Intake and uptake spaces experience corrosion and coating degradation. Spaces can experience high operating temperatures, have inherently complex geometry, and are open to weather and sea spray.



BACKGROUND: 2023 Design Memorandum cited use of inherently heat resistant MIL-PRF-23236D, Type VII, Class 19 or 18/19 coatings required for intake / uptakes.

- Type VII are ultrahigh solids, edge-retentive systems.
- Explained cross-qualification between Class 5 and Class 19 coatings.
- Class 19 and Class 19/18 coatings are generally novolac chemistry products that are qualification tested at 150 - 500°F (with two hours at 500°F) and during a one-year in-service test.

RESULT: FY-25, Change 1, Standard Item 009-32, Table 3, Lines 22 & 22A includes requirements for "MIXING ROOM/GAS TURBINE EXHAUST UPTAKE SPACES AND EXHAUST TRUNKS" that requires:

- Abrasive blasting to SSPC-SP 10 level of cleanliness.
- Application of MIL-PRF-23236D, Type VII, Class 19 or 18/19 coating system.

Change adopts high performance, heat resistant coating in spaces that can be subject to exhaust heat and requires abrasive blasting to remove existing corrosion and maximize coating adhesion.

What's New With Standard Item 009-32?
Required Heat Resistant Coatings in DDG 51 Class Intake/Uptake Spaces

RESULT: FY-25, Change 1, Standard Item 009-32, Table 3:

TABLE 3 STEEL SURFACES SURFACE SHIPS	LINE	A SURFACE PREPARATION	B PRIMER	C	D BULKHEADS & OVERHEADS	E DECKS	F INSULATION	G MARKINGS
FAN ROOMS	21	POWER TOOL CLEAN TO BARE METAL, SSPC-SP 11 - OR - WATERJETTING TO NACE/SSPC-SP WJ-2/L - OR - NEAR WHITE METAL BLAST, NACE 2/SSPC-SP 10 - OR - SSPC-SP 10/L (WAB)/NACE WAB-2/L SEE NOTE (28)	ONE COAT MIL-PRF-23236, TYPE VII, CLASS 15B OR 17, 6 - 8 MILS		ONE FULL COAT MIL-PRF-23236, TYPE VII, CLASS 15B OR 17, 6 - 8 MILS	ONE FULL COAT MIL-PRF-23236, TYPE VII, CLASS 15B OR 17, 6 - 8 MILS	HULL VENTILATION & PIPING INSULATION ONE COAT MIL-PRF-24596, 2 - 4 MILS - OR - ONE COAT MIL-DTL-24607, 2 - 4 MILS IF REQUIRED FOR KIDDING, ONE ADDITIONAL COAT MUST BE APPLIED SEE NOTES (9), (28), (41) & (94)	
	21A	NEAR WHITE METAL BLAST, NACE 2/SSPC-SP 10	"SINGLE COAT" ONE COAT MIL-PRF-23236 TYPE VII CLASS 17/18, 20-30 MILS					
MIXING ROOM/GAS TURBINE EXHAUST UPTAKE SPACES AND EXHAUST TRUNKS	22	NEAR WHITE METAL BLAST, NACE 2/SSPC-SP 10 SEE NOTE (28)	ONE COAT MIL-PRF-23236, TYPE VII, CLASS 19, 4 - 8 MILS		ONE FULL COAT HAZE GRAY OR LIGHT GRAY MIL-PRF-23236, TYPE VII, CLASS 19, 10 - 12 MILS	ONE FULL COAT HAZE GRAY OR LIGHT GRAY MIL-PRF-23236, TYPE VII, CLASS 19, 10 - 12 MILS		
	22A	*NEAR WHITE METAL BLAST, NACE 2/SSPC-SP 10* *SEE NOTE (28)*	*"SINGLE COAT"* *ONE COAT MIL-PRF-23236, TYPE VII, CLASS 19/18, 20-30 MILS*					
UNDER AFFF PROPORTIONING UNITS (INSIDE THE COAMING) SEE NOTE (77)	23	POWER TOOL CLEAN TO BARE METAL, SSPC-SP 11 SEE NOTES (32) & (34)	ONE COAT MIL-PRF-32284, TYPE III, 12 - 18 MILS SEE NOTE (88)			ONE COAT MIL-PRF-32284, TYPE III, 12 - 18 MILS SEE NOTE (88)		

Changed to Class 19

Added single coat Line

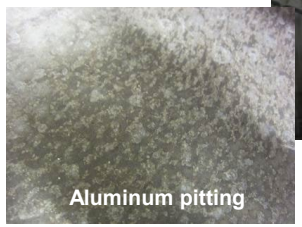
Change adopts high performance, heat resistant coating in spaces that can be subject to exhaust heat and requires abrasive blasting to remove existing corrosion and maximize coating adhesion.

What's New With Standard Item 009-32 on Coatings?
Required Coating of Amah Voids

ISSUE: Historically, Standard Item 009-32, Table 2 was silent about LCS 2 Class unmanned amah outrigger interior voids.

BACKGROUND: Corrosion caused by seawater and condensate collecting in interior amah voids.

- Multiple ships have required weld repair of corroded voids.
- Epoxy coating will reduce corrosion risk.



RESULT: Updated FY-25, Change 1, Standard Item 009-32, Table 4 to require simple, single coat of ultrahigh solids epoxy coating in "LCS 2 VARIANT AMAH VOIDS," as follows:

Column A	Column B
"THOROUGH ABRASIVE BLAST CLEANING OF NON-FERROUS METALS, SSPC-SP 17 USING MIL-A-22262 QUALIFIED MEDIA (EXCLUDING COAL SLAG) OR ALUMINUM OXIDE"	"ONE COAT MIL-PRF-23236, TYPE VII CLASS 5 or 7, 4 - 8 MILS SEE NOTE (58)"

Change requires one coat of ultrahigh solids epoxy to isolate the amah void surface from electrolyte and single coat is adequate on aluminum substrate (e.g., rapid-cure, single-coat performance not required).

Background
Needed Update to MIL-A-22262B for Abrasive Blasting Media

BACKGROUND: April 1993 – published MIL-A-22262B(SH), "Abrasive Blasting Media, Ship Hull Blast Cleaning," and the amended/validated specification through Jan 2021.
Update required in accordance with DoD policy and to address key technical issues:

1. Update to expand population of qualified abrasives to include both manufactured and by-product abrasives required to prepare surfaces for conventional coatings and thermal spray nonskid.
   - Aluminum oxide
   - Silicone carbide
   - Metal oxides (varying types)

2. Update to current MIL-STD-961 format and content requirements.

3. Update testing requirements to current ASTM standards and other methods.

4. Update requirements and methods for maximum allowable background radiation to address procurement challenges at some Regional Maintenance Centers.

5. Update to address beryllium content in media to address Occupational Safety and Health Administration (OSHA) shipyard beryllium rule.

   - 2017 OSHA reduced the Permissible Exposure Limit (PEL) for beryllium by order-of-magnitude (2.0 ug/m^3 to 0.2 ug/m^3) for an 8 hour Time Weighted Average (TWA).

   - 2020 new OSHA, 29 C.F.R. § 1910.1024 rules for beryllium PEL of 0.2 µg/m^3 for the 8 hour TWA went into effect at shipyards.

- Since 1987, MIL-A-22262B(SH) requirement for maximum allowable beryllium content of 0.0075% weight (i.e., which is consistent with California, Code 22 CCR 66261.24 and SSPC AB-1) in blast media.

MIL-A-22262B update required to address multiple technical issues.

Public Interest in Need for Update to MIL-A-22262B for Abrasive Blasting Media

BACKGROUND: NAVSEA has extensive history with public and government comments, about the OSHA beryllium Permissible Exposure Limit (PEL) for workplace air.

INPUT AND COMMENTS: Comments included the following:

Feb 2012 - Baltimore Sun article on hazards posed by beryllium during abrasive blasting.


THE SUN

U.S. investigating potential hazards of sand-blasting

Jun 2013 – Public Citizen press release on how shipyards are not testing workers to address beryllium hazard.

Sep 2013 – Daily Press in Mobile, AL cites shipyard worker exposure to "hidden toxin."

Jan 2017 - OSHA reduces the beryllium Permissible Exposure Limit (PEL) by a factor of ten.

Mar 2017 – Supplier of crushed glass abrasive requests that NAVSEA prohibit beryllium in abrasive blast media due to published OSHA beryllium PEL.

Jun 2017 - Mega Rust keynote by Huntington Ingalls, Newport News, Production Vice President commented on need to mitigate beryllium risk.

Feb 2019 - Norfolk Naval Shipyard abrasive media contract solicitation notes, "Coal slag abrasive material is prohibited due to beryllium exposure concerns."

Jul 2020 - New OSHA, 29 C.F.R. § 1910.1024 rules for beryllium come into effect at shipyards.

Oct 2023 - Public comment provided data on MIL-PRF-22262C, Grade A to support establishing maximum beryllium content of 0.00001 weight percent.

Feb 2024 – NAVSEA concluded that establishing a negligible, or de-minimis, or as low as reasonably measurable requirement for beryllium provides options for waterfront industrial hygiene team.

Apr 2024 - Propose Amendment 1 to MIL-PRF-22262C to explain Grade A beryllium level validation.

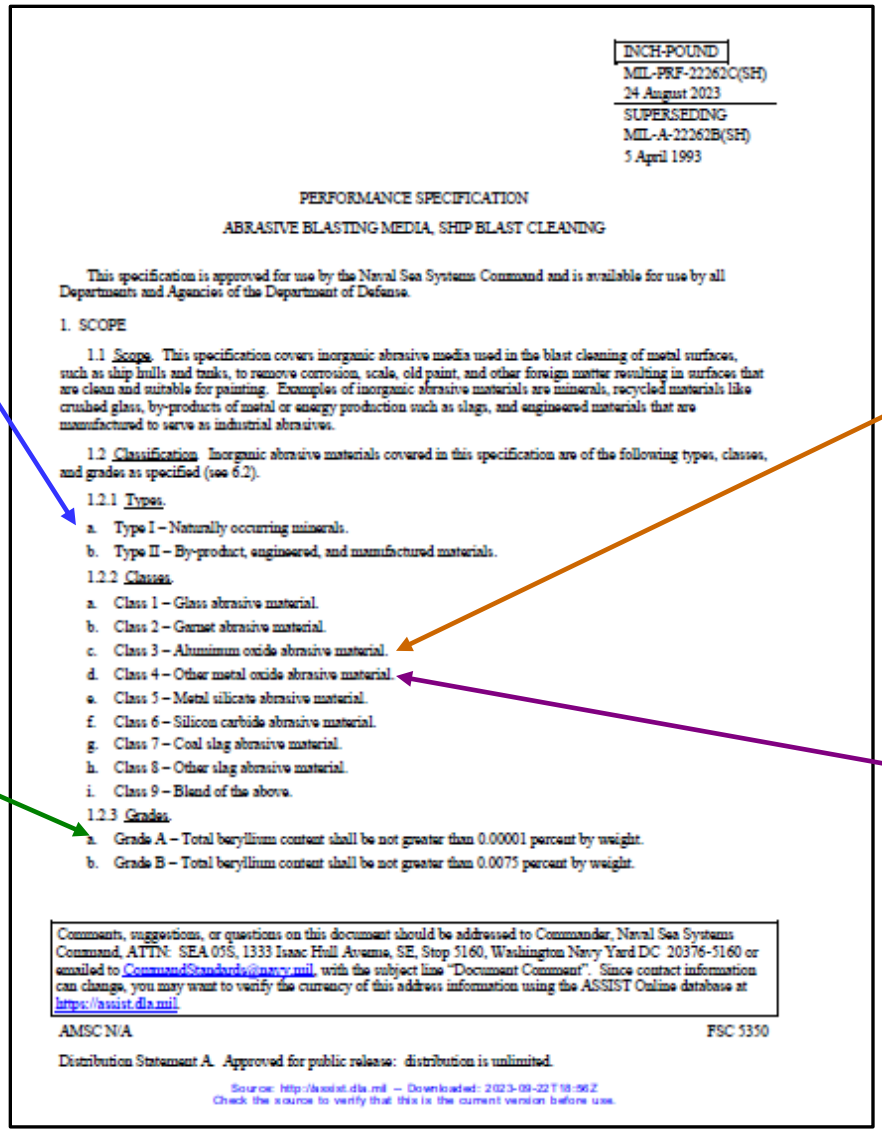
NAVSEA had multiple comments on need to update MIL-A-22262B to address reduction in OSHA beryllium PEL.

Published Update to MIL-PRF-22262C for Abrasive Blasting Media

ISSUE: 24 Aug 2023, NAVSEA published MIL-PRF-22262C that addressed public and government comments about beryllium by creating new Grades of abrasive based on beryllium content:

New Types of abrasive media including natural materials and by-product (slags), engineered materials, and manufactured materials.

New Grades of abrasive media with current limits on maximum allowable beryllium content and new lower limit on beryllium.



INCH-POUND
MIL-PRF-22262C(SH)
24 August 2023
SUPERSEDING
MIL-A-22262B(SH)
5 April 1993

PERFORMANCE SPECIFICATION

ABRASIVE BLASTING MEDIA, SHIP BLAST CLEANING

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 inorganic abrasive media used in the blast cleaning of metal surfaces, such as ship hulls and tanks, to remove corrosion, scale, old paint, and other foreign matter resulting in surfaces that are clean and suitable for painting. Examples of inorganic abrasive materials are minerals, recycled materials like crushed glass, by-products of metal or energy production such as slags, and engineered materials that are manufactured to serve as industrial abrasives.

1.2 Classification. Inorganic abrasive materials covered in this specification are of the following types, classes, and grades as specified (see 6.2).

1.2.1 Types.

a. Type I – Naturally occurring minerals.
b. Type II – By-product, engineered, and manufactured materials.

1.2.2 Classes.

a. Class 1 – Glass abrasive material.
b. Class 2 – Garnet abrasive material.
c. Class 3 – Aluminum oxide abrasive material.
d. Class 4 – Other metal oxide abrasive material.
e. Class 5 – Metal silicate abrasive material.
f. Class 6 – Silicon carbide abrasive material.
g. Class 7 – Coal slag abrasive material.
h. Class 8 – Other slag abrasive material.
i. Class 9 – Blend of the above.

1.2.3 Grades.

a. Grade A – Total beryllium content shall be not greater than 0.00001 percent by weight.
b. Grade B – Total beryllium content shall be not greater than 0.0075 percent by weight.

Comments, suggestions, or questions on this document should be addressed to Commander, Naval Sea Systems Command, ATTN: SEA 05S, 1333 Isaac Hull Avenue, SE, Stop 5160, Washington Navy Yard DC 20376-5160 or emailed to CommandStandards@navy.mil, with the subject line "Document Comment". Since contact 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 5350

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New Classes of abrasive media to include the Class 3 aluminum oxide media required by Standard Item 009-124 thermal spray nonskid process.

New Classes of abrasive media to include the Class 4 "Other Metal Oxide" media of interest to shipyards.

Proposed Amendment 1
MIL-PRF-22262C for Abrasive Blasting Media Beryllium Limit

ISSUE: MIL-PRF-22262C must address abrasive blast media beryllium content to provide waterfront industrial hygiene community with options to address beryllium content in blast media.

- Grade B beryllium limit unchanged from MIL-A-22262B with maximum total allowable beryllium content of 0.0075% by weight.
- Requirement has been in MIL-A-22262 since 1993 and is based on California Title 22, § 66261.24, "Characteristic of Toxicity." All currently qualified blast media remain qualified as Grade B materials.

- Grade A beryllium limit intended to address *de minimis* beryllium limit based on 2023 industry comment and NSWC-CD analysis. Requires maximum total beryllium limit of 0.1 mg/kg (i.e., 0.00001% by weight), using already required analytical methods, defines numerical value and addresses analytical "non-detect."

BACKGROUND: MIL-PRF-22262C includes new abrasive "Grades" based on maximum allowable total beryllium content in media that are required to be measured in accordance with;

"California Code of Regulations, Title 22, Division 4.5, Chapter 11, Article 3, Section 66261.24 – Characteristic of Toxicity"

The California regulations cite methods with Lower Limit of Quantitation (LLOQ) as follows:

- EPA Method 6010B inductively coupled plasma-atomic emission spectrometry, with LLOQ of 0.00004%
  Note, that EPA Method 6010B cannot be used to validate Grade A beryllium level of 0.00001%.
- EPA Method EPA Method 6020 Inductively Coupled Plasma – Mass Spectrometry, with LLOQ of 0.000009%
- EPA Method 7199, Ion Chromatography, with a LLOQ of 0.000001%

WAY AHEAD: Amendment 1 to MIL-PRF-22262C to clarify that Grade A media will have either:

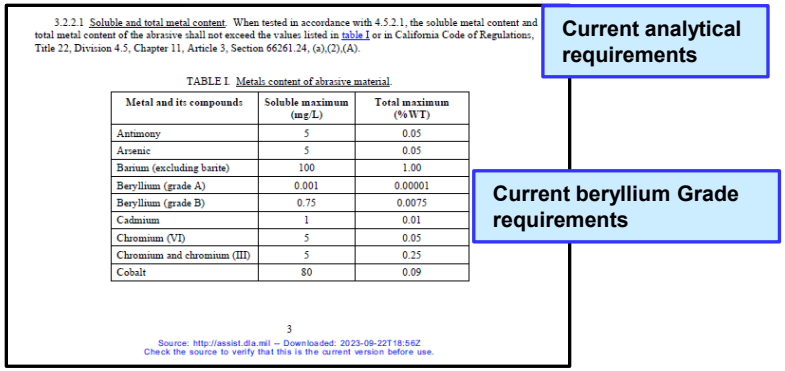
- Beryllium content less than 0.00001% by weight.
  - or -
- A non-detect or below detection level result for beryllium with a Lower Limit of Quantitation (LLOQ) less than 0.00001% by weight.

Proposed MIL-PRF-22262C "Amendment 1" to define analytical methods for validating that Grade A media exhibit negligible amounts of beryllium.

Proposed Amendment 1 to MIL-PRF-22262C
Clarifies That Non-detect Below LLOQ Supports Grade A Qualification

WAY AHEAD: Amendment 1 to MIL-PRF-22262C to clarify that Grade A abrasive media will have either:

- **A measured beryllium level less than 0.00001% by weight.**
  - **or -**
- **A non-detect or below detection level of beryllium with a LLOQ, limit of quantitation, reported limit, or minimum reported limit value of 0.00001% by weight.**



3.2.2.1 Soluble and total metal content. When tested in accordance with 4.5.2.1, the soluble metal content and total metal content of the abrasive shall not exceed the values listed in table I or in California Code of Regulations, Title 22, Division 4.5, Chapter 11, Article 3, Section 66261.24, (a),(2),(A).

TABLE I. Metals content of abrasive material.

Metal and its compounds	Soluble maximum (mg/L)	Total maximum (%WT)
Antimony	5	0.05
Arsenic	5	0.05
Barium (excluding barite)	100	1.00
Beryllium (grade A)	0.001	0.00001
Beryllium (grade B)	0.75	0.0075
Cadmium	1	0.01
Chromium (VI)	5	0.05
Chromium and chromium (III)	5	0.25
Cobalt	80	0.09

3

Current analytical requirements

Current beryllium Grade requirements

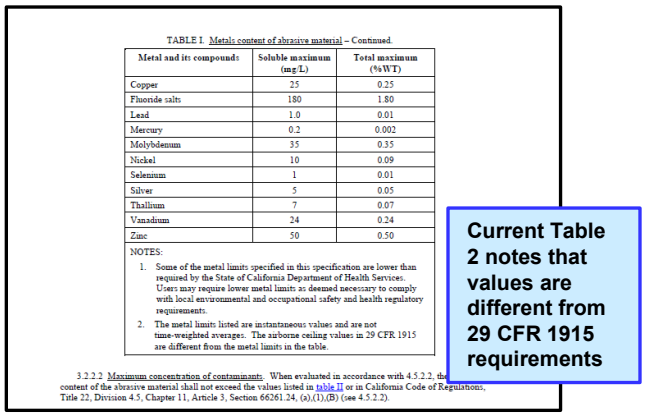


TABLE I. Metals content of abrasive material – Continued.

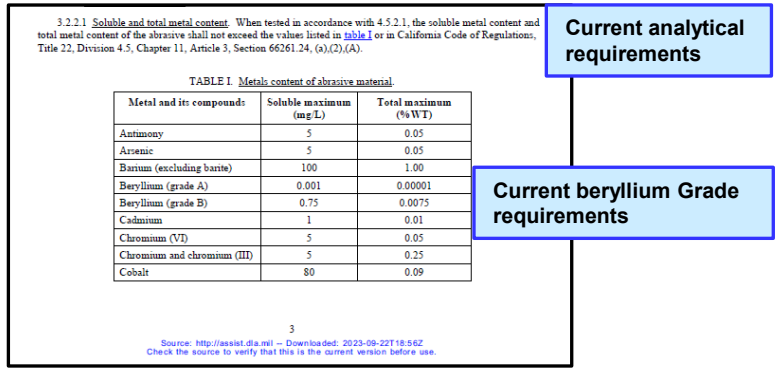
Metal and its compounds	Soluble maximum (mg/L)	Total maximum (%WT)
Copper	25	0.25
Fluoride salts	180	1.80
Lead	1.0	0.01
Mercury	0.2	0.002
Molybdenum	35	0.35
Nickel	10	0.09
Selenium	1	0.01
Silver	5	0.05
Thallium	7	0.07
Vanadium	24	0.24
Zinc	50	0.50

NOTES:
1. Some of the metal limits specified in this specification are lower than required by the State of California Department of Health Services. Users may require lower metal limits as deemed necessary to comply with local environmental and occupational safety and health regulatory requirements.
2. The metal limits listed are instantaneous values and are not time-weighted averages. The airborne ceiling values in 29 CFR 1915 are different from the metal limits in the table.

3.2.2.2 Maximum concentration of contaminants. When evaluated in accordance with 4.5.2.2, the content of the abrasive material shall not exceed the values listed in table II or in California Code of Regulations, Title 22, Division 4.5, Chapter 11, Article 3, Section 66261.24, (a),(1),(B) (see 4.5.2.2).

Current Table 2 notes that values are different from 29 CFR 1915 requirements

Current MIL-PRF-22262C Pages 3 & 4



3.2.2.1 Soluble and total metal content. When tested in accordance with 4.5.2.1, the soluble metal content and total metal content of the abrasive shall not exceed the values listed in table I or in California Code of Regulations, Title 22, Division 4.5, Chapter 11, Article 3, Section 66261.24, (a),(2),(A).

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Antimony	5	0.05
Arsenic	5	0.05
Barium (excluding barite)	100	1.00
Beryllium (grade A)	0.001	0.00001
Beryllium (grade B)	0.75	0.0075
Cadmium	1	0.01
Chromium (VI)	5	0.05
Chromium and chromium (III)	5	0.25
Cobalt	80	0.09

3

Current analytical requirements

Current beryllium Grade requirements

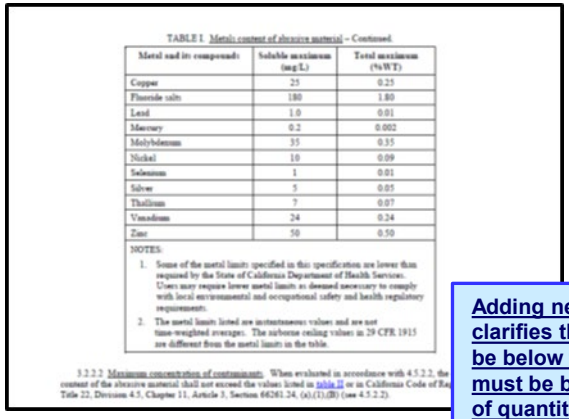

TABLE I. Metals content of abrasive material – Continued.

Metal and its compounds	Soluble maximum (mg/L)	Total maximum (%WT)
Copper	25	0.25
Fluoride salts	180	1.80
Lead	1.0	0.01
Mercury	0.2	0.002
Molybdenum	35	0.35
Nickel	10	0.09
Selenium	1	0.01
Silver	5	0.05
Thallium	7	0.07
Vanadium	24	0.24
Zinc	50	0.50

NOTES:
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Adding new Note 3 that clarifies that metals data must be below the Table I limit or must be below the lower limit of quantitation.

Proposed MIL-PRF-22262C, Amendment 1, Page 4

Proposed MIL-PRF-22262C Amendment 1 to define analytical methods for validating that Grade A media exhibit negligible amounts of beryllium.

Streamlined Conformance Test Requirements from MIL-A-22262B to MIL-PRF-22262C

ISSUE: MIL-PRF-22262C reduces the number of required conformance tests and reduces required frequency of conformance tests.

MIL-A-22262B Conformance Tests	MIL-PRF-22262C Conformance Tests
Sieve Analysis	Particle size distribution
Moisture Content	Moisture content
Weight Change on Ignition	
Free Flow	
Conductivity	Conductivity
Oil Content	Oil Content
Recycled Abrasives	

WAY AHEAD: Submitting existing MIL-A-22262B conformance data set or generating a new MIL-PRF-22262C data set is technically acceptable to update Qualified Products List (QPL) to MIL-PRF-22262C.

MIL-PRF-22262C is more clear about lot conformance test requirements in that:
"Conformance testing shall be performed on the first lot and every 110,000 pounds (50,000 kilograms) thereafter."

Streamlined process for updating products to MIL-PRF-22262C QPL.

Updating MIL-PRF-16173 Specification Include New Types and Classes of Preservatives

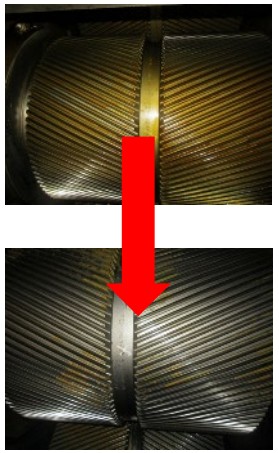
ISSUE: MIL-PRF-16173E(2), "Corrosion Preventive Compound, Solvent Cutback, Cold-Application" with interim amendments published on 19 Oct 2017, included:

- **Updated Volatile Organic Compounds (VOC) requirements in paragraph 3.4.2 to state:**
  VOC for Class I compounds shall exceed 2.8 lbs/gal (340 grams/liter).
  VOC for Class II compounds shall not exceed 2.8 lbs/gal (340 grams/liter).

Interim amendments require full specification update within two years.

WAY AHEAD: NAVSEA significantly updating MIL-PRF-16173 as part of a PCOE project to address the following issues:

- **Instances where Navy has ordered material (i.e., MIL-PRF-16173E, Class I, Grade I) and received a product from one manufacturer that met operational requirements while at other times received the same Class/Grade product from a different manufacturer that did not meet their operational requirements.**



- **Update MIL-PRF-16173 to an "Application" based classification based system instead of current film removal characteristic based system.**

- **Replace obsolete tests like "shed" storage and eliminate archaic/redundant test methods (i.e., MIL-C-16173A published in 1953) by citing current ASTM test methods. Update the requirements for conformance testing.**

- **Add new technology products for long-term corrosion control performance without surface preparation (e.g., spray preservative or wax).**

Update to MIL-PRF-16173 will include new Types, Classes, and Grades to better satisfy Fleet customer needs.

Updating MIL-PRF-16173F Specification
Including New Preservative Types, Modified Classes, and Revised Grades

Created new Types of products to include lower VOC levels (e.g., <100 g/l):

MIL-PRF-16173E cited only two Classes with VOC content as:
- **"High" exceeding 340 g/l, or**
- **"Low" not exceeding 340 g/l.**

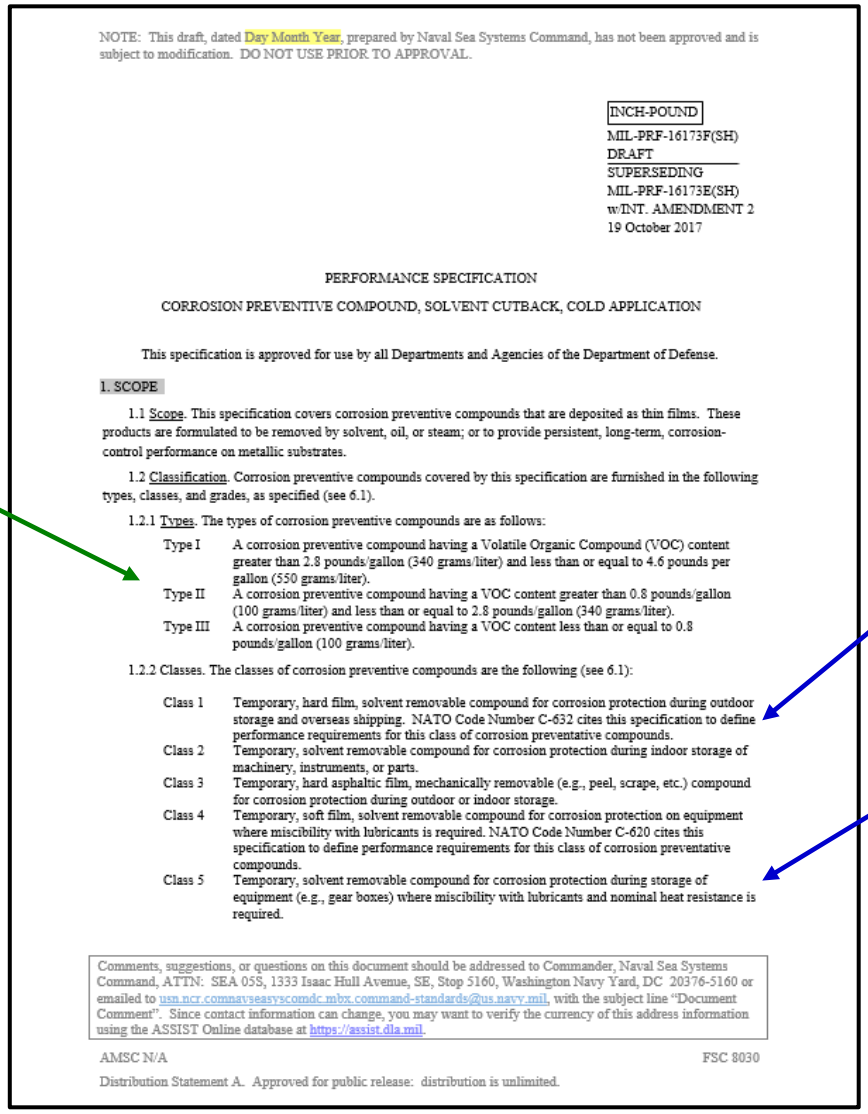
Corrosion preventative compounds not cited in 40 CFR 63, Shipbuilding and Ship Repair NESHAP.

VOC levels from widespread application of corrosion preventative compounds could be regulated.

Type I – Maximum VOC 550 g/l

Type II – Maximum VOC of 340 g/l

Type III – Maximum VOC of 100 g/l



NOTE: This draft, dated Day Month Year, prepared by Naval Sea Systems Command, has not been approved and is subject to modification. DO NOT USE PRIOR TO APPROVAL.

INCH-POUND
MIL-PRF-16173F(SH)
DRAFT
SUPERSEDING
MIL-PRF-16173E(SH)
w/INT. AMENDMENT 2
19 October 2017

PERFORMANCE SPECIFICATION

CORROSION PREVENTIVE COMPOUND, SOLVENT CUTBACK, COLD APPLICATION

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers corrosion preventive compounds that are deposited as thin films. These products are formulated to be removed by solvent, oil, or steam; or to provide persistent, long-term, corrosion-control performance on metallic substrates.

1.2 Classification. Corrosion preventive compounds covered by this specification are furnished in the following types, classes, and grades, as specified (see 6.1).

1.2.1 Types. The types of corrosion preventive compounds are as follows:

Type I	A corrosion preventive compound having a Volatile Organic Compound (VOC) content greater than 2.8 pounds/gallon (340 grams/liter) and less than or equal to 4.6 pounds per gallon (550 grams/liter).
Type II	A corrosion preventive compound having a VOC content greater than 0.8 pounds/gallon (100 grams/liter) and less than or equal to 2.8 pounds/gallon (340 grams/liter).
Type III	A corrosion preventive compound having a VOC content less than or equal to 0.8 pounds/gallon (100 grams/liter).

1.2.2 Classes. The classes of corrosion preventive compounds are the following (see 6.1):

Class 1	Temporary, hard film, solvent removable compound for corrosion protection during outdoor storage and overseas shipping. NATO Code Number C-632 cites this specification to define performance requirements for this class of corrosion preventative compounds.
Class 2	Temporary, solvent removable compound for corrosion protection during indoor storage of machinery, instruments, or parts.
Class 3	Temporary, hard asphaltic film, mechanically removable (e.g., peel, scrape, etc.) compound for corrosion protection during outdoor or indoor storage.
Class 4	Temporary, soft film, solvent removable compound for corrosion protection on equipment where miscibility with lubricants is required. NATO Code Number C-620 cites this specification to define performance requirements for this class of corrosion preventative compounds.
Class 5	Temporary, solvent removable compound for corrosion protection during storage of equipment (e.g., gear boxes) where miscibility with lubricants and nominal heat resistance is required.

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

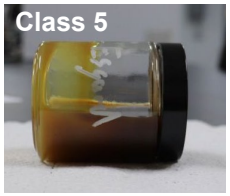
AMSC N/A FSC 8030

Distribution Statement A. Approved for public release: distribution is unlimited.

Modified Classes to include those that relate to specific NATO AFLP-1135 Interchangeability Code Numbers:

- **C-632 Corrosion preventive compound hard film, cold application**
- **C-620 Corrosion preventive compound soft film, cold application**

Modified Classes to create new requirements for specific applications (e.g., gear boxes, fasteners, etc.).



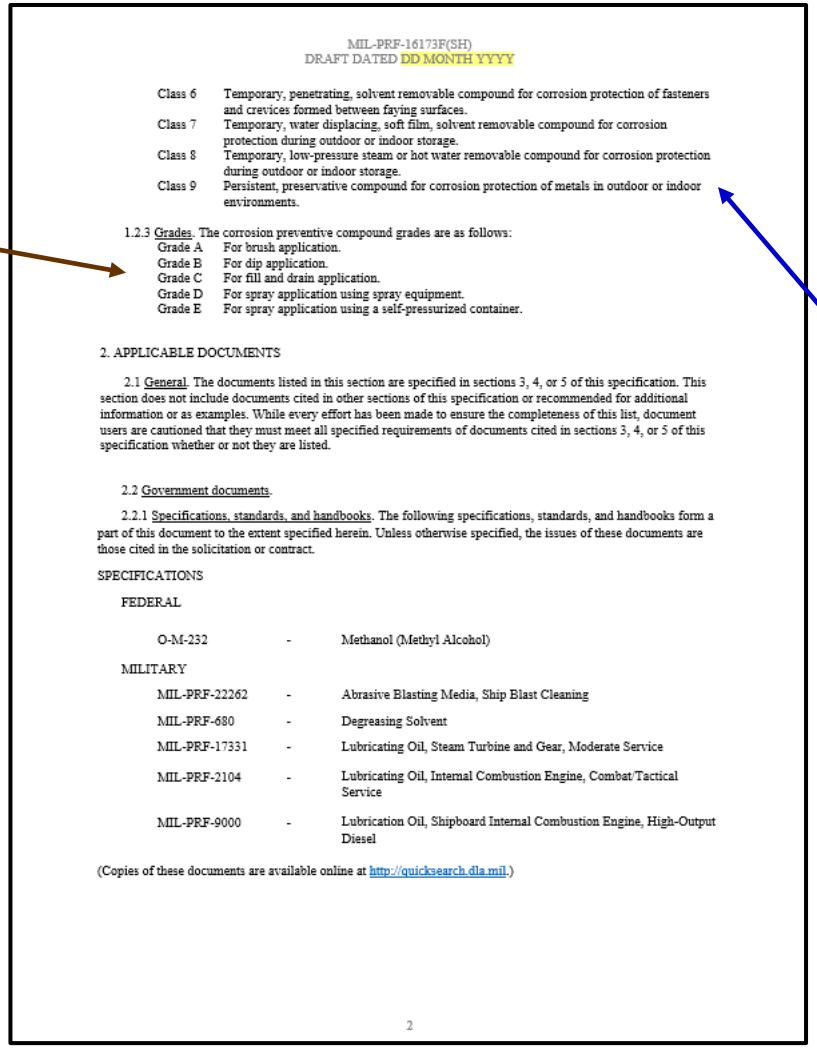
Draft MIL-PRF-16173F includes new Type III with low limit for corrosion preventative compound VOC level and new Classes.

Updating MIL-PRF-16173F Specification Including New Preservative Types, Modified Classes, and Revised Grades

Revised Grades to define the application methods (e.g., fill and drain, self-pressurized container, etc.):

MIL-PRF-16173E included application method in text:
3.12.1 Brushing.
3.12.2 Dipping.
3.12.3 Filling or flushing.
3.12.4 Spraying.

Defining requirements for Grade D &E spray applications supports larger scale installations.



MIL-PRF-16173F(SH)
DRAFT DATED DD MONTH YYYY

Class 6 Temporary, penetrating, solvent removable compound for corrosion protection of fasteners and crevices formed between faying surfaces.
Class 7 Temporary, water displacing, soft film, solvent removable compound for corrosion protection during outdoor or indoor storage.
Class 8 Temporary, low-pressure steam or hot water removable compound for corrosion protection during outdoor or indoor storage.
Class 9 Persistent, preservative compound for corrosion protection of metals in outdoor or indoor environments.

1.2.3 Grades. The corrosion preventive compound grades are as follows:
Grade A For brush application.
Grade B For dip application.
Grade C For fill and drain application.
Grade D For spray application using spray equipment.
Grade E For spray application using a self-pressurized container.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 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, 4, or 5 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.

SPECIFICATIONS

FEDERAL

O-M-232 - Methanol (Methyl Alcohol)

MILITARY

MIL-PRF-22262 - Abrasive Blasting Media, Ship Blast Cleaning
MIL-PRF-680 - Degreasing Solvent
MIL-PRF-17331 - Lubricating Oil, Steam Turbine and Gear, Moderate Service
MIL-PRF-2104 - Lubricating Oil, Internal Combustion Engine, Combat/Tactical Service
MIL-PRF-9000 - Lubrication Oil, Shipboard Internal Combustion Engine, High-Output Diesel

(Copies of these documents are available online at http://quicksearch.dla.mil.)

2

Modified Classes to include new, "Persistent" preservative compound that is not tested for specific removal mechanism:

- **Longest ASTM B117 salt fog periodicity.**
- **Requires ASTM G155 xenon arc accelerated weathering.**

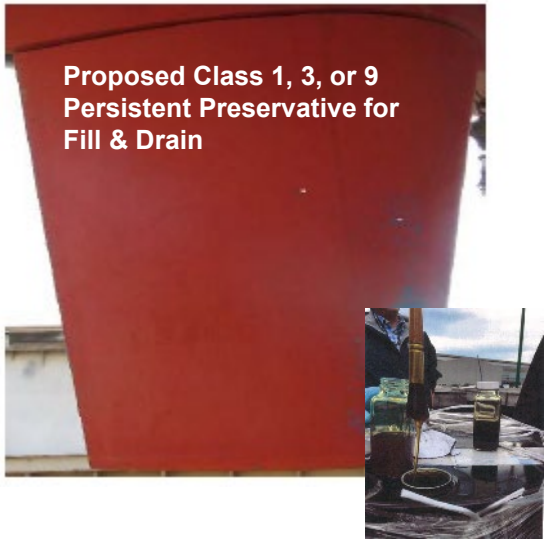
Proposed MIL-PRF-16173F includes new Types, Classes, and Grades of corrosion preventative compounds to improve TCC and address fleet needs.

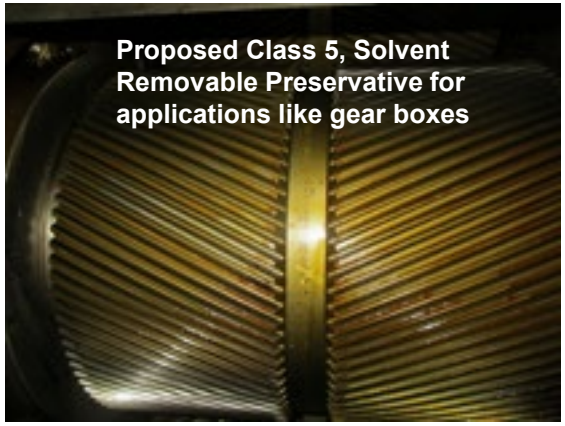
Updated MIL-PRF-16173 Specification
Include Multiple New Requirements for Preservatives

STATUS: Draft MIL-PRF-16173F that includes new Type, Class, and Grade requirements.

NAVSEA will maintain Qualified Product Database listing for preservative products.

- **NAVSEA completed technical development and final editorial review - Apr 2024**
- **Draft MIL-PRF-16173F to be released to the industry and public for informal comment - Jul 2024**
- **NAVSEA adjudicates comments and releases to Specification Review Board (SRB) - Aug 2024**
- **NAVSEA adjudicates SRB comments - Sep 2024**
- **MIL-PRF-16173 to be published - Oct 2024**





NAVSEA currently soliciting comments on draft MIL-PRF-16173F from Navy technical community.

Updated MIL-PRF-16173 Specification
Opportunity for Application of future, Class 9 "Persistent" Preservatives

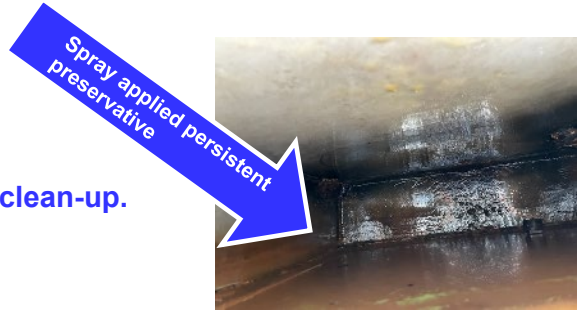
STATUS: Updated MIL-PRF-16173F specification includes new Type, Class, and Grade requirements, includes "Class 9, Persistent" preservatives intended as supplement for coatings in spaces where coating installation and maintenance is impractical and corrosion is an issue.

Key technical considerations for use of "persistent" preservatives:

- Space or void where coatings are impractical to install that are analogous to interior of rudder or bilge keel, but more accessible to the environment or weather.
- Cosmetic appearance of waxy, oily coating will not be an issue. Translucent, amber preservative attracts dirt or dust.
- Thick, waxy material will not interfere with mechanical equipment operation.
- Runoff or release of preservative to the environment will not be significant.

TECHNICAL COMMUNITY INPUT NEEDED ON KEY ISSUES:

1. Define OQE for acceptable, and unacceptable, preservative application process.
   April 2024 - Shipyard demonstrated process in tank.
2. Shipyard process validated UV light inspection, process controls, and clean-up.
3. Need to define applicable spaces and areas for preservatives, possible new SURFMEPP Design Memorandum.



NAVSEA currently soliciting comments on draft MIL-PRF-16173F in Navy technical community.

Update to TT-C-492C Specification In Process
Anti-sweat Coatings

ISSUE: TT-C-492C, Coating Compound, Paint Anti-sweat last amended in 1977. Update required to address:

- Current TT-C-492C cites archaic Federal and ASTM test methods for performance and fire testing.
- TT-C-492C does not, and will not, have a qualified product list, but rather will be a "first article" specification.
- Current TT-C-492 not cited in Standard Item 009-32, but condensation control coatings cited by tradename – not in accordance with CNRMC policy.

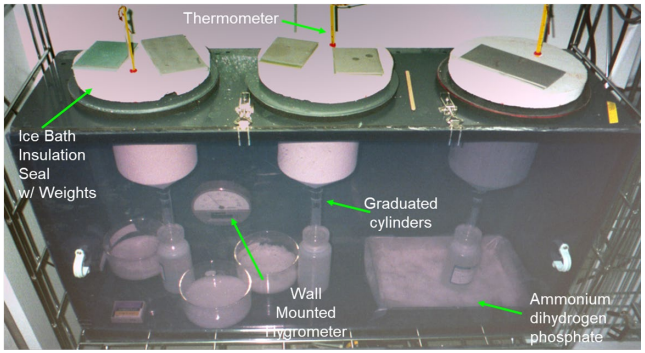
- **Shipbuilder interest in expanding use of anti-sweat coatings to serve as alternative to bulk insulation resulted in numerous comments:**

1. NSWC-CD reviewed fire performance requirements with SEA 05P5. Aligned fire performance requirements with thickness requirements and to streamline qualification.
2. Class 1 – Thermal conductivity ≤0.08 watts/(meter × kelvin) [0.05 BTU/(hour × foot × °F)].
   Class 2 – Thermal conductivity≥ 0.08 watts/(meter × kelvin) [0.05 BTU/(hour × foot × °F)].
   Class 3 – Prevents condensation by water absorption or water vapor absorption.
3. Application A –maximum final DFT greater than 3.2 millimeters (⅛ inch).
   Application B – maximum final DFT equal to or less than 3.2 millimeters (⅛ inch)
4. May 2024 - SEA 05P2 concurred with final draft of TT-C-492D.
5. All products cited in FY-25, Change 1, Standard Item 009-32, satisfy applicable TT-C-492D requirements.

TT-C-492D specification update in process complete published TT-C-492D on ASSIST on 11 Jul 2024.

TT-C-492D Specification Update In Process

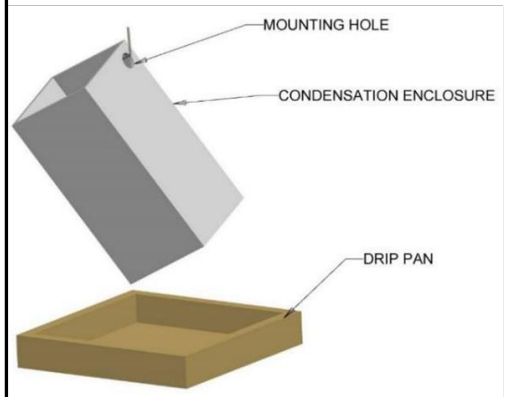
NEW REQUIREMENTS: Updated TT-C-492D uses a new condensation testing apparatus that is easier to fabricate, more realistic to coat, and that can be fabricated from steel, aluminum, or copper to address specific applications.

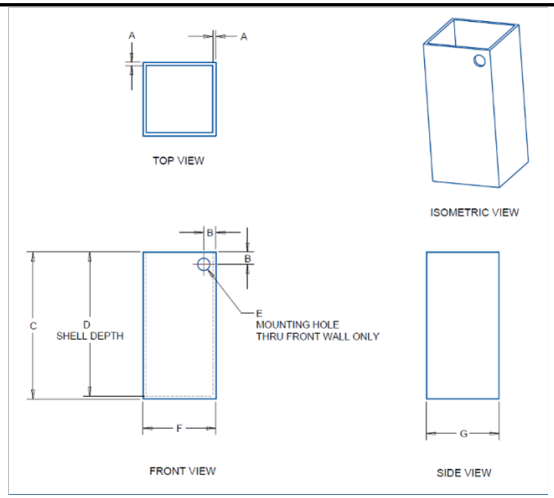


Current TT-C-492C

Updated TT-C-492D

Enclosure will be coated and filled with ice and water.





- Pass/fail based on any accumulated condensation at specified time intervals (8, 24, and 90 hours). Manufacturer must define thickness required to satisfy requirements.
- Corners and flat sides to represent bulkheads.
- Exposure to 10 to 15.6 °C (50 to 60 °F) and a relative humidity of 41 to 45%.

Updated document incorporates shipbuilder comments and applications in Standard Item 009-32.

Opportunity to Reduce Waste
Update Coating Shelf Life Requirements

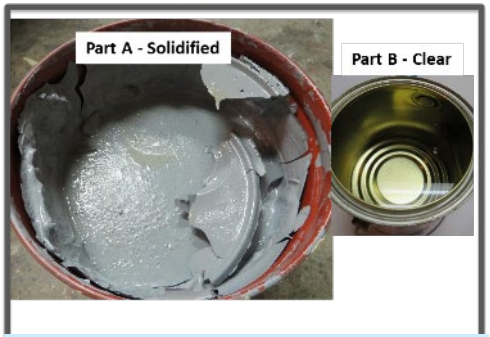
ISSUE: During COVID, SEA 05P2 concurred with multiple requests to use coatings that had exceeded shelf life. Added mixing and inspection requirements.

RESULT: To date, none of the expired coatings exhibited inadequate performance.
Some specifications define shelf life; "This coating has a 1-year nonextendable shelf-life . . ."

ACTIONS: PCoE task for NRL to examine shelf life issue by collecting and conformance testing expired topside and nonskid coatings.

- Expired, unopened kits (18 – 72 months after manufacture).
- Testing included conformance tests and adhesion, color stability, and 500 hours of accelerated weathering ASTM G154, QUV-A.

Vast majority of samples some settling, but readily mixed



One sample gelled in can and could not be mixed

RESULT: NAVSEA soliciting comments from coating manufacturers and waterfront on how to leverage results:

- Extend shelf life to 18 or 24 months?
- Precedent setting departure to include double mixing time and SUPERVISOR inspection.
- Training for SUPERVISOR, currently requires; ". . . written authorization from the SUPERVISOR."

Expanding Technology Applications
Thermal Spray Nonskid Application on LPD 17 and DDG 51 Class Ships

BACKGROUND: TSN applied only to larger ships since 2011.
TSN has excellent adhesion and demonstrated 10-year service life.
First 900 ft^2 TSN applied in 2011, currently more than 200,000 ft^2 of TSN in Fleet.

OBJECTIVE: Demonstrate TSN application process on other ship decks, such as LPD 17 and DDG 51 Class to reduce nonskid replacement frequency during availabilities by extending nonskid service life.

LPD 17 Class

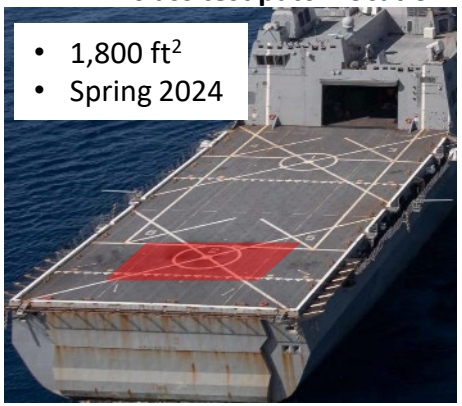
- 1,800 square foot patch, center of flight deck.
- Area subject to aircraft and cargo operations.
- Similar application process as LHD and LHA.
- Application performed by contractor to validate their thermal spray personnel and field application procedures as per Technical Publication 1687.

DDG 51 Class

- Entire 5,000 ft^2 flight deck.
- Deck subject to sea spray.
- Some initial work required to verify thermal load is not an issue.


Heat from molten aluminum deposition on deck is fixed

LPD-17 class test patch location



DDG-51 class flight deck

Need input from technical community on update to Standard Item 009-124 to cite ship-class-specific requirements.

SSRAC Working Group Issue

Maintenance Community Interest in Exterior "Underlayment" for Walking Area Nonskid

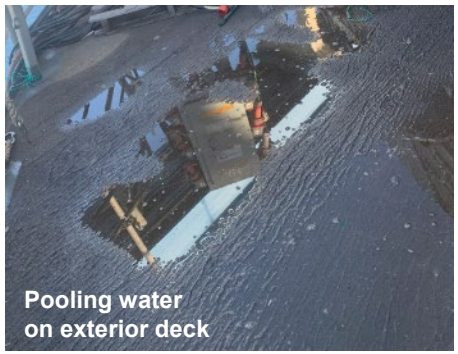
BACKGROUND: Destroyer new construction ship specification included "Deck Drainage" requirement to apply: "polyurethane nonskid system using Palmer Products Co. 'Polydeck', Products Research and Chemical Co. 'Proreco III' or equal."
System intended to fill depressions and irregularities in the deck plating surface and slope nonskid toward deck drains (i.e., sloped outboard from the centerline at a slope of ¼ inch per foot, unless otherwise noted.

Since 1999, Standard Item 009-32, Table 2 for Glass Reinforced Plastic (GRP) decks cited surface preparation down to: "POLYURETHANE OVERLAY SUBSTRATE."

Neither of these application reference "underlayments" qualified to MIL-PRF-3135, "Deck Covering Underlay Materials."

ISSUE: NAVSEA addressing inquiries from waterfront maintenance team about products to repair or replace thick materials on exterior decks that slope nonskid toward deck drains.

- Proreco III was acquired and cancelled due to health and safety concerns
- Polyurethane material that was used on fiberglass decks was cancelled by manufacturer.



Need technical community input on applications for exterior underlayments, not cited in MIL-PRF-3135.

SSRAC Working Group Issue

Maintenance Community Interest in Exterior "Underlayment" for Walking Area Nonskid

ISSUE: In-service maintenance teams using combinations of non-qualified products to attempt repair and replacement of these exterior "underlayments."

MIL-PRF-3135 "Deck Covering Underlay Materials" Scope section states:

"This specification establishes the performance requirements for deck covering underlay materials to be applied over primed or unprimed, clean steel and aluminum interior deck surfaces on naval vessels in order to provide a smooth, level, and/or properly sloped surface over which a final deck covering system will be applied."

WAY AHEAD: NAVSEA near-term action is working with shipbuilder and waterfront maintenance community to identify "or equal" products used at new construction.

Need input about which specific "underlayments" do, and do not, perform effectively in exterior service under nonskid.

NAVSEA longer-term action is to update MIL-PRF-3135 and Standard Item 009-32 to define materials and requirements for exterior "underlayments.

NSWC-CD working on PCoE project to define requirements and candidates for exterior "underlayments" to slope nonskid on decks towards drains. Key considerations include:

- Water absorption of product and ability of product to retard deck corrosion.
- Adhesion of product to deck and nonskid.
- Weight of potentially 3-4 inch thick underlayment layer.

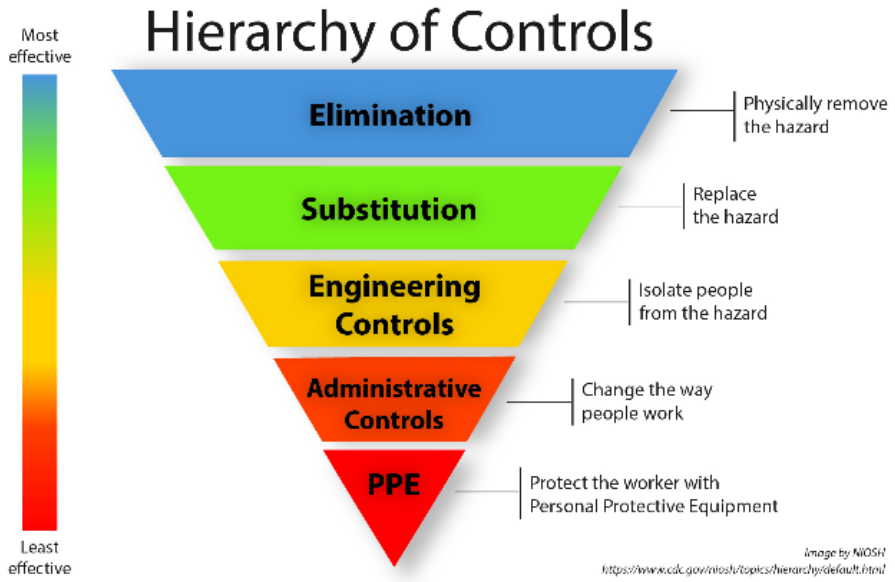
Need technical community input on applications for exterior underlayments, not cited in MIL-PRF-3135.

QUESTIONS?

Industrial Hygiene Staff Determine Options to Cite Updated Beryllium Limit in MIL-PRF-22262C

ISSUE: Current MIL-PRF-22262C abrasive blast media contain beryllium and National Institute for Occupational Safety and Health (NIOSH) explains how controlling exposures to workplace hazardous materials relates to worker health and safety.

- NIOSH provides a hierarchy of hazardous material controls to determine which actions will best control exposures with preferred order of action as follows:



WAY AHEAD: MIL-PRF-22262C Grades, based on maximum allowable beryllium content, will allow shipyards to adopt material ELIMINATION an as-need basis, but shipyards can still use ENGINEERING CONTROLS and ADMINISTRATIVE CONTROLS and PPE.

Adding Grades to MIL-PRF-22262C provides industrial hygiene staff with tools to make informed abrasive media selection decisions.