

PERFORMANCE SPECIFICATION
DECK COVERING MATERIALS, TILE AND SHEET FLOORING

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

1. SCOPE

1.1 Scope. This specification covers tile and sheet flooring materials for shipboard use as deck covering systems.

1.2 Classification. Tile and sheet flooring materials are of the following types, classes, grades, and compositions as specified (see 6.2).

1.2.1 Types.

- a. Type Ia – Solid vinyl floor tile
- b. Type Ib – Vinyl composition tile
- c. Type IIa – Wear-resistant, halogen-free floor tile
- d. Type IIb – Wear-resistant, fatigue-reducing, halogen-free floor tile
- e. Type III – Rubber insulating matting, sheet (electrical grade sheeting)
- f. Type IV – Rubber insulating matting, mat (electrical grade matting)
- g. Type V – Ceramic tile, porcelain, unglazed
- h. Type VI – Ceramic tile, quarry, unglazed
- i. Type VII – Pile yarn floor covering (wool carpet)
- j. Type VIII – Peel and stick nonskid (self-adhering slip-resistant treads)

1.2.2 Classes.

- a. Class 1 – For general shipboard use
- b. Class 2 – For submarine use

1.2.3 Grades (only applicable to types III and IV).

- a. Grade 1 – Nominal maximum use voltage of 1,000 volts
- b. Grade 2 – Nominal maximum use voltage of 7,500 volts
- c. Grade 3 – Nominal maximum use voltage of 17,000 volts

1.2.4 Compositions (only applicable to type VIII).

- a. Composition A – Interior

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>.

- b. Composition B – Exterior
- c. Composition C – Wear-resistant

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.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-5624 - Turbine Fuel, Aviation, Grades JP-4 and JP-5

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-1623 - Fire Performance Requirements and Approved Specifications for Interior Finish Materials and Furnishings (Naval Shipboard Use)

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

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications 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.

CODE OF FEDERAL REGULATIONS (CFR)

40 CFR 60, Appendix A-7, Method 24 - Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings

40 CFR 63, Subpart II - National Emission Standards for Shipbuilding and Ship Repair (Surface Coating)

40 CFR 63, Appendix A, Method 311 - Analysis of Hazardous Air Pollutant Compounds in Paints and Coatings by Direct Injection into a Gas Chromatograph

40 CFR 261.24 - Toxicity Characteristic

(Copies of these documents are available online at www.ecfr.gov.)

NAVAL SEA SYSTEMS COMMAND (NAVSEA) PUBLICATIONS

S9510-AB-ATM-010 - Nuclear Powered Submarine Atmosphere Control Manual

(Copies of the chapter titled “Material Control Program” are available from Commander, Naval Sea Systems Command, ATTN: SEA 05Z4, 1333 Isaac Hull Ave. SE Stop 5122, Washington Navy Yard DC 20376-5122 or by email request to CommandStandards@navy.mil.)

T9070-AL-DPC-020/077-2 - NAVSEA Hazardous Material Avoidance Process

(Copies of this document are available online via Technical Data Management Information System (TDMIS) at <https://mercury.tdmis.navy.mil> by searching for the document number without the suffix. Refer questions, inquiries, or problems to: DSN 296-0669, Commercial (805) 228-0669. This document is available for ordering (hard copy) via the Naval Logistics Library (NLL) at <https://nll.navsup.navy.mil>. For questions regarding the NLL, contact the NLL Customer Service at nllhelpdesk@navy.mil, (866) 817-3130, or (215) 697-2626/DSN 442-2626.)

2.3 Non-Government publications. The following documents 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.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- ANSI B74.12 - American National Standard Specification for the Size of Abrasive Grain-Grinding Wheels, Polishing and General Industrial Uses

(Copies of this document are available online at www.uama.org.)

- ANSI A108/A118/A136.1 - American National Specifications for the Installation of Ceramic Tile

- ANSI A137.1 - American National Standard Specifications for Ceramic Tile

(Copies of these documents are available online at <http://webstore.ansi.org>.)

ASTM INTERNATIONAL

- ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and General Applications

- ASTM A794/A794M - Standard Specification for Commercial Steel (CS), Sheet, Carbon (0.16 % Maximum to 0.25 % Maximum), Cold-Rolled

- ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus

- ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

- ASTM C1028 - Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method

- ASTM D178 - Standard Specification for Rubber Insulating Matting

- ASTM D1242 - Standard Test Methods for Resistance of Plastic Materials to Abrasion

- ASTM D1337 - Standard Practice for Storage Life of Adhesives by Viscosity and Bond Strength

- ASTM D2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine

- ASTM D2240 - Standard Test Method for Rubber Property—Durometer Hardness

- ASTM D3278 - Standard Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus

- ASTM D3654/D3654M - Standard Test Methods for Shear Adhesion of Pressure-Sensitive Tapes

- ASTM D4060 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser

- ASTM D5848 - Standard Test Method for Mass Per Unit Area of Pile Yarn Floor Coverings

- ASTM D6450 - Standard Test Method for Flash Point by Continuously Closed Cup (CCCFP) Tester

- ASTM D6859 - Standard Test Method for Pile Thickness of Finished Level Pile Yarn Floor Coverings

- ASTM D6862 - Standard Test Method for 90 Degree Peel Resistance of Adhesives
- ASTM E11 - Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves
- ASTM E1252 - Standard Practice for General Techniques for Obtaining Infrared Spectra for Qualitative Analysis
- ASTM F137 - Standard Test Method for Flexibility of Resilient Flooring Materials with Cylindrical Mandrel Apparatus
- ASTM F718 - Standard Specification for Shipbuilders and Marine Paints and Coatings Product/Procedure Data Sheet
- ASTM F925 - Standard Test Method for Resistance to Chemicals of Resilient Flooring
- ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile

- ASTM F1265 - Standard Test Method for Resistance to Impact for Resilient Floor Tile
- ASTM F1514 - Standard Test Method for Measuring Heat Stability of Resilient Flooring by Color Change
- ASTM F1515 - Standard Test Method for Measuring Light Stability of Resilient Flooring by Color Change
- ASTM F1700 - Standard Specification for Solid Vinyl Tile
- ASTM F1914 - Standard Test Methods for Short-Term Indentation and Residual Indentation of Resilient Floor Covering
- ASTM F2217/F2217M - Standard Practice for Coating/Adhesive Weight Determination

(Copies of these documents are online at www.astm.org.)

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

- ISO/IEC 17025 - General Requirements for the Competence of Testing and Calibration Laboratories

(Copies of this document are available online at www.iso.org.)

SAE INTERNATIONAL

- SAE J300 - Engine Oil Viscosity Classification

(Copies of this document are available online at www.sae.org.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Qualification. Deck covering materials furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.2 and 6.3).

3.2 Material. Deck covering materials supplied under this specification shall comply with all Navy occupational health and safety regulations and have the following characteristics.

3.2.1 Recycled, recovered, or environmentally preferable, or biobased materials. Recycled, recovered, or environmentally preferable, or biobased materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.2.2 Fire performance. When tested in accordance with 4.6, the deck covering system shall conform to the applicable requirements in MIL-STD-1623.

3.2.3 Off-gassing (class 2 only). The class 2 deck covering system materials shall be evaluated for off-gassing in accordance with the requirements of 4.7. Based on the circumstances of use and the chemical nature of the class 2 deck covering system materials, the Navy will determine whether off-gas testing is required or if an administrative assessment is acceptable. In order to be considered acceptable for use in submarines, the class 2 deck covering system materials shall be assigned to either the “Permitted” or “Limited” category (see 4.7 and 6.7).

3.2.4 Toxicity. When evaluated in accordance with 4.8, the deck covering system shall pose no serious or high risk to the health of personnel or the environment when used for its intended purpose (see 4.8 and 6.8).

3.2.5 Prohibited materials. The deck covering system shall not contain any chemicals categorized as “prohibited” in accordance with T9070-AL-DPC-020/077-2.

3.2.6 Metals content. When tested in accordance with 4.10, the maximum allowable amount of each soluble metal and the total metal content in each system component of the deck covering system shall not exceed the values listed in [table I](#). Total metal content may be submitted in place of soluble metal content so long as the value is lower than what is listed in the soluble metal column.

TABLE I. Metals content.

Metal and its compound in each deck covering dry film	Soluble metal, maximum (mg/L)	Total metal content, maximum (wt%)
Antimony	15	0.015
Arsenic	5	0.005
Barium (excluding barite)	100	0.10
Beryllium	0.75	0.0002
Cadmium	1	0.0005
Chromium (VI)	1	0.001
Chromium or chromium (III)	560	0.56
Cobalt	50	0.005
Copper	25	0.01
Fluoride salts	180	0.18
Lead	5	0.005
Mercury	0.2	0.0002
Molybdenum	350	0.35
Nickel	20	0.02
Selenium	1	0.002
Silver	5	0.001
Tantalum	100	0.100
Thallium	7	0.007
Tungsten	100	0.100
Vanadium	24	0.01
Zinc	250	0.25

3.2.7 Volatile organic compound (VOC) content. When tested in accordance with 4.11, the VOC content of each adhesive or grout component of the deck covering system shall not exceed 250 grams per liter (g/L) (2.08 pounds per gallon [lb/gal]), and the VOC content of each sealant component of the deck covering system shall not exceed 420 g/L (3.51 lb/gal).

3.2.8 Hazardous air pollutant (HAP) content. When evaluated in accordance with 4.12, the total HAP content, as defined by the 40 CFR 63, Subpart II (Environmental Protection Agency [EPA] National Emission Standards for Hazardous Air Pollutants [NESHAP]) requirements for shipbuilding and ship repair; of each system adhesive, grout, or sealant component shall not exceed the VOC limit prescribed for the specific grades (see 4.11).

3.2.9 Halogen content. The type IIa and IIb wear-resistant deck tiles shall be halogen-free as reported on the manufacturer's ASTM F718 data sheet. When tested in accordance with 4.13, the materials used in wear-resistant deck tiles shall be halogen-free and have no more than 0.2 percent by weight halogen content.

3.2.10 Storage life. When tested in accordance with 4.14, the adhesive, grout, and sealer components of the deck covering system shall exceed a storage life of 18 months.

3.2.11 Flash point. When tested in accordance with 4.15, all adhesive, grout, and sealant components shall not flash at a temperature lower than 38 °C (100 °F).

3.3 Identification characteristics. The following values for identification characteristics shall be as specified (see 6.2). The values shall be established for the complete deck covering system prior to qualification inspection and shall be evaluated in accordance with 4.5. The purpose of these values is to serve as a basis for determining that the material being offered is essentially the same as that which was approved under qualification inspection.

- a. Color and pattern
- b. Unit of issue
- c. Product dimensions (length, width, height) (millimeters) (inches)
- d. Weight per area (grams per square meter [g/m²])(pounds per square foot [lb/ft²]) (ASTM F2217/F2217M)
- e. System components and product names (e.g., adhesive, grout, sealer, tile, sheet)
- f. Composition of solid components (e.g., wool, vinyl, rubber)
- g. Chemical nature of adhesive, grout, and sealant components (e.g., epoxy, polyurethane, latex)
- h. Shelf life of adhesive, grout, and sealant components

3.4 Requirements for types I and II.

3.4.1 Abrasion resistance. When tested in accordance with 4.17.1, the average weight loss for type Ia and Ib tiles shall not exceed 0.16 gram (0.0056 ounce). When tested in accordance with 4.17.1, the average weight loss for type IIa and IIb tiles shall not exceed 0.03 gram (0.001 ounce).

3.4.2 Slip resistance. When tested in accordance with 4.17.2, the static coefficient of friction (SCOF) shall be not less than 0.60 for dry surfaces.

3.4.3 Industry testing for solid vinyl tile (type Ia only). When tested in accordance with 4.17.3, the deck covering shall conform to the requirements of ASTM F1700, class III, type B.

3.4.4 Industry testing for vinyl composition tile (type Ib only). When tested in accordance with 4.17.4, the deck covering shall conform to all of the requirements of ASTM F1066, class 2.

3.4.5 Chemical resistance for wear-resistant deck tile (types IIa and IIb). When tested in accordance with 4.17.5, the deck tile system shall show no blistering or wrinkling and no more than a slight whitening or softening upon removal of the fluid wetted sponges. After 2 hours of air drying, the portion of the panel that was covered by fluid wetted sponges shall be indistinguishable, with regard to color and gloss, from the unexposed areas of the tile system.

3.4.6 Impact resistance for wear-resistant deck tile (types IIa and IIb). When tested in accordance with 4.17.6, the deck tile system shall show no visible signs of chipping, cracking, or detachment from the steel plate.

3.4.7 Resistance to heat and light for wear-resistant deck tile (types IIa and IIb). When tested in accordance with 4.17.7, the exposed surface of the deck tile system shall show no appreciable change in color, delamination, checking, or cracking. The measured color change shall not exceed 5ΔE as defined in ASTM F1514 and ASTM F1515.

3.4.8 Resistance to indentation (type IIa only). When tested in accordance with 4.17.8, the average initial indentation shall not exceed 10 percent, and the maximum initial indentation of any single specimen shall not exceed 12 percent. The average residual indentation at the end of the 60-minute recovery period shall not exceed 8 percent, and the maximum residual indentation of any single specimen shall not exceed 10 percent.

3.4.9 Hardness (type IIb only). When tested in accordance with 4.17.9, the Shore A hardness shall be between 60A and 80A.

3.5 Requirements for types III and IV.

3.5.1 Industry testing for rubber insulating matting. When tested in accordance with 4.18.1, the matting shall meet all of the type IIb requirements as defined by the table titled "Physical Requirements" of ASTM D178.

3.5.1.1 Abrasion resistance. When tested in accordance with 4.18.1.1, the average thickness loss shall not exceed 0.05 millimeter (0.002 inch).

3.5.1.2 Flexibility. When tested in accordance with 4.18.1.2, the matting shall not show any breaks, cracks, or other permanent damage.

3.5.2 Rubber insulating matting electrical test requirements.

3.5.2.1 Grade 1 – nominal maximum use voltage of 1,000 volts. When tested in accordance with 4.18.2, the matting shall meet all of the class 0 requirements as defined by the table titled “Electrical Test Requirements” of ASTM D178.

3.5.2.2 Grade 2 – nominal maximum use voltage of 7,500 volts. When tested in accordance with 4.18.2, the matting shall meet all of the class 1 requirements as defined by the table titled “Electrical Test Requirements” of ASTM D178.

3.5.2.3 Grade 3 – nominal maximum use voltage of 17,000 volts. When tested in accordance with 4.18.2, the matting shall meet all of the class 2 requirements as defined by the table titled “Electrical Test Requirements” of ASTM D178.

3.6 Requirements for types V and VI.

3.6.1 Stain resistance. When tested in accordance with 4.19.1, the tile shall meet the class A stain resistance requirements as defined by ANSI A137.1.

3.6.2 Deep abrasion. When tested in accordance with 4.19.1, the tile shall meet the class P2 deep abrasion requirements as defined by ANSI A137.1.

3.6.3 Slip resistance. When tested in accordance with 4.19.2, the SCOF shall be not less than 0.70 for dry surfaces and 0.60 for wet surfaces.

3.6.4 Industry testing for porcelain tile, unglazed (type V only). When tested in accordance with 4.19.1, type V porcelain tiles shall meet the requirements of table 10 in ANSI A137.1.

3.6.5 Industry testing for quarry tile, unglazed (type VI only). When tested in accordance with 4.19.1, type VI quarry tiles shall meet the requirements of table 7 in ANSI A137.1.

3.6.6 Industry testing for adhesives, grouts, and sealants. When tested in accordance with 4.19.3, all tile adhesives, grouts, and sealants qualified as part of the deck covering system shall meet the A118.3 requirements of ANSI A108/A118/A136.1.

3.7 Requirements for type VII.

3.7.1 Material. The wool carpet shall be woven through the back and treated by the manufacturer with soil retardant 3M Scotchgard™ Carpet Protector or equal.

3.7.2 Pile weight. When tested in accordance with 4.20.1, the carpet pile weight shall be not less than 1.43 kilograms per square meter (42.2 ounces per square yard).

3.7.3 Pile thickness. When tested in accordance with 4.20.2, the carpet pile thickness shall be not less than 4.83 millimeters (0.19 inch) and not greater than 22.1 millimeters (0.87 inch).

3.7.4 Pile density. When calculated in accordance with 4.20.3, the carpet pile density shall be not less than 136.38 kilograms per cubic meter (kg/m³) (3,700 ounces per cubic yard [oz/yd³]).

3.8 Requirements for type VIII.

3.8.1 Description. The peel and stick nonskid system shall consist of a fabric, film, metal, or composite backing having a uniform closed coat of abrasive particles or a uniform coat of thermal spray nonskid on the front surface and a pressure-sensitive adhesive on the back with a protective cover to prevent contamination of the adhesive by foreign matter until applied.

3.8.1.1 Abrasive. The abrasive particles shall be aluminum oxide, silicon carbide, or other non-ferrous abrasive material with a Mohs hardness of 6 or greater.

3.8.1.2 Adhesive. The adhesive shall be able to adhere immediately to smooth, clean, dry deck surfaces without wrinkling, curling, breaking, or lifting.

3.8.2 Color. When visually inspected, the color shall be black, deck gray, or as specified (see 6.2).

3.8.3 Slip resistance. When tested in accordance with 4.21.1, the SCOF shall be not less than 0.90 for dry surfaces and 0.85 for wet surfaces.

3.8.4 Adhesion.

3.8.4.1 Shear strength. When tested in accordance with 4.21.2.1, the deck covering shall support a weight not less than 4.5 kilograms (10 pounds) for 1 minute.

3.8.4.2 Strip strength. When tested in accordance with 4.21.2.2, the adhesive strength shall be not less than 13.4 kilograms (29.5 pounds).

3.8.5 Chemical resistance. When tested in accordance with 4.21.3, the deck covering shall show no softening, warping, swelling, blistering, peeling, raised areas, discoloration, or bleaching.

3.8.6 Salt spray (fog) resistance. When tested in accordance with 4.21.4, the deck covering shall not exhibit rust staining, spot rusting, peeling at corners or edges, blisters, wrinkling, or any other signs of loss of adhesion.

3.8.7 Aggregate size.

3.8.7.1 Composition A. When tested in accordance with 4.21.5, the abrasive shall be not larger than size 59 grit as defined in ANSI B74.12.

3.8.7.2 Composition B. When tested in accordance with 4.21.5, the abrasive shall be not smaller than size 60 grit as defined in ANSI B74.12.

3.8.8 Abrasion resistance (composition C only). When tested in accordance with 4.21.6, the average weight loss shall not exceed 0.02 gram (0.0007 ounce).

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Qualification inspection (see 4.2).
- b. Conformance inspection (see 4.3).

4.2 Qualification inspection. Qualification inspection shall consist of all the tests specified in [table II](#).

4.2.1 Changes to product. A change in material, production processes, or production equipment used in the manufacture of deck covering materials, which have been qualified, shall require written approval by NAVSEA. Incorporation of any changes, which have not been so approved, shall require requalification of the item in question.

4.3 Conformance inspection. When specified (see 6.2), conformance inspection shall consist of the conformance tests specified in [table II](#). At a minimum, conformance inspections shall be performed on the first lot and every 4,536 kilograms (10,000 pounds) thereafter.

4.3.1 Lot. A lot shall consist of an individual system component of the same type, class, grade, and composition from a single uniform for delivery at one time.

4.4 Inspection conditions. Unless otherwise specified herein, all physical tests on deck covering system materials shall be made at 16 to 27 °C (60 to 80 °F) and 50±10 percent relative humidity.

TABLE II. Test procedures.

Decking type	Characteristic	Requirement paragraph	Test paragraph	Applicable standard	Conformance test
All	General examination	3.3	4.5	---	---
	Fire performance	3.2.2	4.6	---	X
	Off-gassing (submarine use only)	3.2.3	4.7	---	---
	Toxicity	3.2.4	4.8	---	---
	Prohibited materials	3.2.5	4.9	---	---
	Metals content	3.2.6	4.10	---	---
	VOC content	3.2.7	4.11	40 CFR 60, Appendix A-7, Method 24	X
	HAP content	3.2.8	4.12	40 CFR 63, Appendix A, Method 311 (EPA Test Method 311)	---
	Storage life	3.2.10	4.14	ASTM D1337	---
	Flash point	3.2.11	4.15	ASTM D3278/ ASTM D6450	X
Types Ia and Ib	Abrasion resistance	3.4.1	4.17.1	ASTM D4060	---
	Slip resistance	3.4.2	4.17.2	ASTM D2047/ ASTM C1028	X
	Industry testing for solid vinyl tile (type Ia only)	3.4.3	4.17.3	ASTM F1700	---
	Industry testing for vinyl composition tile (type Ib only)	3.4.4	4.17.4	ASTM F1066	---
Types IIa and IIb	Halogen content	3.2.9	4.13	---	---
	Abrasion resistance	3.4.1	4.17.1	ASTM D4060	---
	Slip resistance	3.4.2	4.17.2	ASTM D2047/ ASTM C1028	X
	Chemical resistance	3.4.5	4.17.5	ASTM F925	---
	Impact resistance	3.4.6	4.17.6	ASTM F1265	---
	Resistance to heat and light	3.4.7	4.17.7	ASTM F1514 and F1515	---
	Resistance to indentation (type IIa only)	3.4.8	4.17.8	ASTM F1914	---
	Hardness (type IIb only)	3.4.9	4.17.9	ASTM D2240	---

TABLE II. Test procedures - Continued.

Decking type	Characteristic	Requirement paragraph	Test paragraph	Applicable standard	Conformance test
Types III and IV	Industry testing for rubber insulating matting	3.5.1	4.18.1	ASTM D178	---
	Abrasion resistance	3.5.1.1	4.18.1.1	ASTM D1242	---
	Flexibility	3.5.1.2	4.18.1.2	ASTM F137	---
	Electrical testing for rubber insulating matting	3.5.2	4.18.2	ASTM D178	---
Types V and VI	Stain resistance	3.6.1	4.19.1	ANSI A137.1	---
	Deep abrasion	3.6.2	4.19.1	ANSI A137.1	---
	Slip resistance	3.6.3	4.19.2	ASTM D2047/ ASTM C1028	X
	Industry testing for porcelain tile, unglazed (type V only)	3.6.4	4.19.1	ANSI A137.1	---
	Industry testing for quarry tile, unglazed (type VI only)	3.6.5	4.19.1	ANSI A137.1	---
	Industry testing for adhesives, grouts, and sealants	3.6.6	4.19.3	ANSI A108/A118/A1 36.1	---
Type VII	Pile weight	3.7.2	4.20.1	ASTM D5848	---
	Pile thickness	3.7.3	4.20.2	ASTM D6859	---
	Pile density	3.7.4	4.20.3	---	---
Type VIII	Slip resistance	3.8.3	4.21.1	ASTM C1028	X
	Adhesion - shear strength	3.8.4.1	4.21.2.1	ASTM D3654/D3654M	---
	Adhesion - strip strength	3.8.4.2	4.21.2.2	ASTM D6862	---
	Chemical resistance	3.8.5	4.21.3	ASTM F925	---
	Salt spray (fog) resistance	3.8.6	4.21.4	ASTM B117	---
	Aggregate size (compositions A and B only)	3.8.7	4.21.5	ANSI B74.12/ ASTM C136/C136M	---
	Abrasion resistance (composition C only)	3.8.8	4.21.6	ASTM D4060	---

4.5 General examination. The deck covering system shall be visually inspected and identification characteristics shall be evaluated for conformance to the requirements as specified in 3.3.

4.6 Fire performance. The as-applied deck covering system shall be tested in accordance with MIL-STD-1623 on 0.64-centimeter (1/4-inch) thick steel or aluminum panels, or fiber-cement board having a density of $1,442 \pm 160 \text{ kg/m}^3$ (90 ± 10 pounds per cubic foot [lb/ft^3]). Results of fire performance testing shall conform to the requirements of 3.2.2.

4.6.1 Fire testing provisions. All fire tests specified in this document shall be conducted by an independent testing laboratory that is accredited to ISO/IEC 17025 and is approved by NAVSEA. Accreditation shall be obtained from a recognized accreditation body such as American Association for Laboratory Accreditation (A2LA) or International Code Council's International Accreditation Services (IAS). The scope of accreditation shall include specific flammability and fire tests required for qualification. All other fire test provisions shall be as specified (see 6.2 and 6.6).

4.7 Off-gassing (class 2 only). The class 2 deck covering system materials, including all components to be installed as part of the system, shall be evaluated for off-gassing in accordance with S9510-AB-ATM-010 chapter titled "Material Control Program" (see 3.2.3 and 6.7). If the Navy determines that off-gas testing is required, testing shall be conducted at a NAVSEA approved test facility (see 3.2.3). The Navy will review the off-gas test results and assign a usage category. Additionally, the Navy will assign a usage category if an administrative review is conducted in lieu of off-gas testing (see 3.2.3).

4.8 Toxicity. A Health Hazard Assessment (HHA) will be conducted to ensure conformance to 3.2.4 as required by the qualifying activity. The Navy and Marine Corps Public Health Center (NMCPHC) will evaluate the deck covering system using data provided by the manufacturer/distributor to the NMCPHC (see 3.2.4 and 6.8).

4.9 Prohibited materials. Prohibited materials shall be verified for conformance to 3.2.5 as required by the qualifying activity.

4.10 Metals content. Soluble and total metal content, except tantalum and tungsten, shall be determined on pulverized cured film of the deck covering system in accordance with 40 CFR 261.24(a), Toxicity Characteristic Leaching Procedure (TCLP). The test results for each metal shall be in accordance with 3.2.6. Tantalum and tungsten soluble metal content and total metal content shall be analyzed in accordance with 4.10.1. Calculation of individual hazardous metal contents can be based on either the manufacturer's testing of batches or the supplier's data for raw materials used in the product. When specified (see 6.2), a formulation value shall be provided that will not be exceeded when the deck covering is tested in accordance with this paragraph.

4.10.1 Tantalum and tungsten content. The tantalum and tungsten content of the cured deck covering shall be determined using any appropriate spectroscopy test method. The tests shall be conducted in accordance with the instrument manufacturer's directions. Data supporting the test method choice and analytical accuracy shall be established. The test results for tantalum or tungsten shall be in conformance with the requirements of 3.2.6.

4.11 VOC content. The VOC content of adhesive, grout, and sealant components of the deck covering system shall be measured in accordance with 40 CFR 60, Appendix A-7, Method 24. Results shall conform to the requirements of 3.2.7.

4.12 HAP content. The HAP content of each system component shall be measured in accordance with 40 CFR 63, Appendix A, Method 311 (EPA Test Method 311). Solvent fractions shall be identified in accordance with ASTM E1252 with the results recorded as percent weight of the total covering. Alternate methods of analysis shall be approved by NAVSEA. When specified (see 6.2), formulation data may be used by manufacturers in lieu of testing to demonstrate compliance with 3.2.8. The formulation data shall have a consistent and quantitatively known relationship to the testing required. Calculation of individual HAP contents can be based on either manufacturer evaluation of batches or supplier data for raw materials used in the product. Results shall conform to the requirements of 3.2.8.

4.13 Halogen content. The halogen content of the wear-resistant deck tiles shall be determined by X-ray fluorescence or analytically following an inspection and analyses of the chemical composition of all ingredients.

4.14 Storage life. All adhesives, grouts, and sealers shall be tested in accordance with ASTM D1337, procedure A – Viscosity Test. The components shall be conditioned at room temperature (23 ± 2.5 °C [73 ± 5 °F]) for not less than 18 months. Results shall conform to the requirements of 3.2.10.

4.15 Flash point. All deck covering materials shall be tested in accordance with ASTM D3278, Method A, or ASTM D6450. Results shall conform to the requirements of 3.2.11.

4.16 Test panel preparation.

4.16.1 Method 1 (types I, II, III, IV, V, VI, and VIII). Steel panels conforming to ASTM A794/A794M, or equivalent, approximately 102 by 102 by 3.2 millimeters (4 by 4 by $\frac{1}{8}$ inches) with a 6.4-millimeter ($\frac{1}{4}$ -inch) hole in the center shall be prepared by buffing the surface on one side with a power-driven, flexible-backed number 24 abrasive disk using such pressure as will just polish the surface of the metal. The deck covering system shall be applied in accordance with manufacturer instructions (see 6.2). All components of the qualifying system shall be used. Underlayment materials shall not be applied beneath the qualifying system.

4.16.2 Method 2 (types I, II, V, and VI). Steel panels conforming to ASTM A794/A794M, or equivalent, approximately 152 by 305 by 3.2 millimeters (6 by 12 by $\frac{1}{8}$ inches) shall be prepared by buffing the surface on one side with a power-driven, flexible-backed number 24 abrasive disk using such pressure as will just polish the surface of the metal. The deck covering system shall be applied in accordance with manufacturer instructions (see 6.2). All components of the qualifying system shall be used. Underlayment materials shall not be applied beneath the qualifying system.

4.16.3 Method 3 (type VIII). Stainless steel panels conforming to ASTM A240/A240M, or equivalent, approximately 25 by 203 by 3.2 millimeters (1 by 8 by $\frac{1}{8}$ inches) shall be prepared by buffing the surface on one side with a power-driven, flexible-backed number 24 abrasive disk using such pressure as will just polish the surface of the metal. The deck covering system shall be applied in accordance with manufacturer instructions (see 6.2). All components of the qualifying system shall be used. The system shall be allowed to cure for 48 hours at room temperature (23 ± 2.5 °C [73 ± 5 °F]) before testing is conducted.

4.16.4 Method 4 (type VIII). Stainless steel panels conforming to ASTM A240/A240M, or equivalent, approximately 152 by 305 by 6 millimeters (6 by 12 by $\frac{1}{4}$ inches) (nominal) shall be prepared by buffing the surface on one side with a power-driven, flexible-backed number 24 abrasive disk using such pressure as will just polish the surface of the metal. The buffed plates shall then be cleaned with a solvent and shall be visibly free from all rust, scale, and organic matter. The deck covering system shall be applied in accordance with manufacturer instructions (see 6.2). All components of the qualifying system shall be used. The system shall be allowed to cure for 48 hours at room temperature (23 ± 2.5 °C [73 ± 5 °F]) before testing is conducted.

4.16.5 Method 5 (type VIII). Mild steel panels conforming to ASTM A794/A794M, or equivalent, approximately 152 by 305 by 3.2 millimeters (6 by 12 by $\frac{1}{8}$ inches) shall be prepared by buffing the surface on one side with a power-driven, flexible-backed number 24 abrasive disk using such pressure as will just polish the surface of the metal. The tare weight of each panel shall be determined to the nearest 0.1 gram (0.0002 pound). The areas of the test panel shall be determined to the nearest 0.13 centimeters squared (cm^2) (0.02 inches squared [in^2]). The deck covering system shall be applied to each panel so as to completely cover the steel plates, and the deck covering system shall be allowed to cure for 96 hours. After curing, any excess covering shall be cleaned from the edge of the panels in accordance with manufacturer instructions (see 6.2). The weight of each covered panel shall be determined to the nearest 0.1 gram (0.0002 pound), and the tare weight shall be subtracted to give the net weight of the covering. The average area of the three test panels shall be determined. The three net weights shall be averaged and divided by the average test panel area to convert to grams per square centimeter.

4.16.6 Method 6 (type VIII). Stainless steel panels conforming to ASTM A240/A240M, or equivalent, approximately 76.2 by 152 by 3.2 millimeters (3 by 6 by $\frac{1}{8}$ inches) shall be prepared by buffing the surface on one side with a power-driven, flexible-backed number 24 abrasive disk using such pressure as will just polish the surface of the metal. The deck covering system shall be applied in accordance with manufacturer instructions (see 6.2). All components of the qualifying system shall be used. The system shall be allowed to cure for 48 hours at room temperature (23 ± 2.5 °C [73 ± 5 °F]) before testing is conducted.

4.17 Test procedures for types I and II.

4.17.1 Abrasion resistance. Three sample panels shall be prepared in accordance with 4.16.1. Abrasion resistance shall be tested in accordance with ASTM D4060 using a CS 17 wheel and a 1-kilogram (2.2-pound) load for 1,000 cycles. The results shall conform to 3.4.1.

4.17.2 Slip resistance. Three sample panels shall be prepared in accordance with 4.16.2. Slip resistance shall be tested in accordance with ASTM D2047 or ASTM C1028 to determine conformance to 3.4.2.

4.17.3 Industry testing for solid vinyl tile (type Ia only). Sample panels shall be prepared and tested in accordance with ASTM F1700, class I or III, to determine conformance to 3.4.3.

4.17.4 Industry testing for vinyl composition floor tile (type Ib only). Sample panels shall be prepared and tested in accordance with ASTM F1066, class 1 or 2, to determine conformance to 3.4.4.

4.17.5 Chemical resistance (type IIa and IIb). Three sample panels shall be prepared in accordance with 4.16.2. Chemical resistance shall be tested in accordance with ASTM F925, spot test, covered procedure, at 23 ± 2.5 °C (73 ± 5 °F) for 24 hours with the reagents listed below. The test shall begin no later than 12 hours from the cure-to-service time specified by the manufacturer's ASTM F718 data sheet. Examinations shall be made at the start time, 2 hours, and 12 hours following chemical removal, and shall conform to the requirements of 3.8.5.

- a. Potable water
- b. 10W-40 oil (SAE J300)
- c. JP-5 jet fuel (MIL-DTL-5624)

4.17.6 Impact resistance (type IIa and IIb). Sample panels shall be prepared in accordance with 4.16.2. Impact resistance shall be tested in accordance with ASTM F1265.

4.17.7 Resistance to heat and light (type IIa and IIb). Sample panels shall be prepared in accordance with 4.16.2. The heat and light resistance of the deck tile sample panels shall be tested for 2,000 hours in accordance with ASTM F1514 and 2,000 hours in accordance with ASTM F1515.

4.17.8 Resistance to indentation (type IIa only). A sample panel shall be prepared in accordance with 4.16.2. To determine conformance with indentation and residual indentation, testing shall be in accordance with ASTM F1914. The sample panel shall be tested at room temperature (23 ± 2.5 °C [73 ± 5 °F]) and residual indentation testing shall be performed using a total of 63.5 kilograms (140 pounds) applied to a flat geometry foot for a time of 10 ± 1 minutes, and a recovery of 60 ± 1 minutes. The flat bottom surface of the indentation tip must rest completely on the flat surface of the deck tiles.

4.17.9 Hardness (type IIb only). A sample panel shall be prepared in accordance with 4.16.2. To determine conformance with 3.4.9, hardness testing shall be in accordance with ASTM D2240 using the Shore A scale. The sample panel shall be tested at room temperature (23 ± 2.5 °C [73 ± 5 °F]).

4.18 Test procedures for types III and IV.

4.18.1 Industry testing for rubber insulating matting. The matting shall be tested in accordance with ASTM D178 to determine conformance to 3.5.1.

4.18.1.1 Abrasion resistance. Three samples shall be tested in accordance with ASTM D1242 to determine conformance to 3.5.1.1.

4.18.1.2 Flexibility. The matting shall be tested in accordance with ASTM F137 with the 12.7-millimeter (½-inch) diameter mandrel to determine conformance to 3.5.1.2.

4.18.2 Electrical test requirements for rubber insulating matting. The matting shall be tested in accordance with ASTM D178 to determine conformance to 3.5.2.

4.19 Test procedures for types V and VI.

4.19.1 Industry testing for ceramic tile. Sample panels shall be prepared and tested in accordance with ANSI A137.1 to determine conformance to 3.6.1, 3.6.2, and either 3.6.4 for type V or 3.6.5 for type VI.

4.19.2 Slip resistance. Three sample panels shall be prepared in accordance with 4.16.2. Slip resistance shall be tested in accordance with ASTM D2047 or ASTM C1028 to determine conformance to 3.6.3.

4.19.3 Industry testing for adhesives, grouts, and sealants. The tile adhesive, grout, and sealant shall be tested in accordance with A118.3 of ANSI A108/A118/A136.1 to determine conformance to 3.6.6.

4.20 Test procedures for type VII.

4.20.1 Surface pile weight. The carpet surface pile weight shall be tested in accordance with ASTM D5848 to determine conformance to 3.7.2.

4.20.2 Pile thickness. The carpet pile thickness shall be tested in accordance with ASTM D6859 to determine conformance to 3.7.3.

4.20.3 Pile density. The carpet pile density shall be calculated by multiplying the surface pile weight in kilograms per square meter by 1,000 and dividing by the pile thickness in millimeters to determine conformance to 3.7.4.

4.21 Test procedures for type VIII.

4.21.1 Slip resistance. Three sample panels shall be prepared in accordance with 4.16.3. Slip resistance shall be tested in accordance with ASTM C1028 to determine conformance to 3.8.3.

4.21.2 Adhesion.

4.21.2.1 Shear strength. Three stainless steel sample panels shall be prepared and tested in accordance with ASTM D3654/D3654M, procedure A. Results shall conform to the requirements of 3.8.4.1.

4.21.2.2 Strip strength. Four stainless steel sample panels shall be prepared in accordance with 4.16.4. The deck covering shall be tested in accordance with ASTM D6862. Results shall conform to the requirements of 3.8.4.2.

4.21.3 Chemical resistance. Three sample panels shall be prepared in accordance with 4.16.5. Chemical resistance shall be tested in accordance with ASTM F925, spot test, covered procedure, at 23 ± 2.5 °C (73 ± 5 °F) for 24 hours with the reagents listed below. The test shall begin no later than 12 hours from the cure-to-service time specified by the manufacturer's ASTM F718 data sheet. Examinations shall be made at the start time, 2 hours, and 12 hours following chemical removal, and shall conform to the requirements of 3.8.5.

- a. Potable water
- b. 10W-40 oil (SAE J300)
- c. JP-5 jet fuel (MIL-DTL-5624)

4.21.4 Salt spray (fog) resistance. Three sample panels shall be prepared in accordance with 4.16.6. The panels shall be exposed to 5 percent salt spray for 14 days in accordance with ASTM B117. Upon removal, the panels shall be washed gently in warm running water (not more than 38 °C [100 °F]) until free from any visible salt deposits and then examined. The results shall conform to 3.8.6.

4.21.5 Aggregate size. The abrasive grains shall be tested in accordance with ASTM C136/C136M utilizing sieves that meet the requirements of ASTM E11. Results shall conform to the requirements of 3.8.7.

4.21.6 Abrasion resistance. Three sample panels shall be prepared in accordance with 4.16.1. Abrasion resistance shall be tested in accordance with ASTM D4060 using a CS 17 wheel and a 1-kilogram (2.2-pound) load for 1,000 cycles. The results shall conform to 3.8.8.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. Materials covered by this document are intended for use as floor coverings on U.S. Navy ships where additional service requirements are required. Type Ia, Ib, IIa, and IIb tiles are intended for use on interior, dry, walking surfaces. Type III and IV deck coverings are electrically insulating, and intended for use in electrical spaces and in front of electrical equipment. Type V and VI tiles are intended for use on walking surfaces that may become wet, such as sanitary and food service spaces. Type VII pile yarn carpeting is intended for use in interior spaces with a cosmetic requirement. Type VIII deck coverings are peel and stick nonskid treads. Type VIII composition A materials are intended for use on interior decks and composition B are intended for use on exterior decks. Type VIII composition C materials are intended for use on interior or exterior areas of high traffic for increased wear resistance.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Type, class, grade, and composition (see 1.2).
- c. Identification characteristics (see 3.3).
- d. Color requirement for type VIII materials (see 3.8.2).
- e. When conformance inspection is required (see 4.3).
- f. Additional fire testing provisions (see 4.6.1 and 6.6).
- g. Formulation value for metals content, if required (see 4.10).
- h. Whether formulation data may be used by manufacturers in lieu of testing to demonstrate HAP content compliance (see 4.12).
- i. When manufacturer's installation instructions are required (see 4.16).
- j. Packaging requirements (see 5.1).
- k. When a Safety Data Sheet (SDS) is required (see 6.5).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Products List QPL No. XX642 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from 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. An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at <https://assist.dla.mil>.

6.4 Supersession data. This specification supersedes MIL-DTL-15562G dated 31 May 1996, MIL-PRF-32170A dated 13 June 2006, and DDD-C-95 dated 16 April 1965, while ASTM F1700, ASTM F1066, and ANSI A137.1 are incorporated in the specification. The specification also supersedes MIL-PRF-24667C dated 22 May 2008 and MIL-PRF-24667C w/Interim Amendment 1 dated 27 March 2018 for type XI peel and stick nonskid materials. A cross reference of type designations are listed in [table III](#).

TABLE III. Supersession data.

MIL-PRF-XX642 type	Superseded or incorporated type
Type Ia and Ib	ASTM F1700/ASTM F1066 ^{1/}
Type IIa and IIb	MIL-PRF-32170 ^{2/}
Type III	MIL-DTL-15562 type I ^{2/}
Type IV	MIL-DTL-15562 types II and III ^{2/}
Type V	ANSI A137.1 ^{1/}
Type VI	ANSI A137.1 ^{1/}
Type VII	DDD-C-95 ^{2/}
Type VIII	MIL-PRF-24667 type XI ^{2/}
FOOTNOTES:	
^{1/} Incorporated type.	
^{2/} Superseded type.	

6.5 Safety data sheet (SDS). When specified (see 6.2), contracting officers will identify those activities requiring copies of completed SDSs prepared in accordance with Appendix D of 29 CFR 1910.1200. In order to obtain the SDS, federal acquisition regulation (FAR) clause 52.223-3 will be in the contract. The contracting activity should be given an SDS at the time of contract award.

6.6 Additional fire testing provisions. NAVSEA reserves the right to witness the tests, and perform any of the tests set forth herein where such testing is deemed necessary to assure compliance to prescribed requirements of the qualification tests. NAVSEA will provide a letter upon request that indicates the approved laboratories which are accredited to ISO/IEC 17025 and which details how to obtain and maintain accreditation (see 6.2).

6.7 Material certification. Materials to be installed in submarines are to be controlled to prevent off-gassing, which contaminates the submarine's atmosphere and can result in health hazards to personnel or deleterious effects on machinery. These controls are administered through the Submarine Material Control Program, which is described in the Nuclear Powered Submarine Atmosphere Control Manual, S9510-AB-ATM-010 chapter titled "Material Control Program." Under the Submarine Material Control Program, all materials considered for use on submarines require certification and assignment of a usage category. Under the certification process, candidate materials are selected by Navy activities or contractors, and a request for certification is submitted 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. The certification request is accompanied by detailed information, including descriptions of the material, method of application, usage, and storage. A chemical analysis is conducted, which can be accomplished through off-gas testing. If off-gas testing is required, it must be conducted in a Government approved laboratory. Information pertaining to this test requirement may be obtained from 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. Based on the chemical analysis results, a usage category is assigned to the material defining whether, and to what extent, the material may be used on submarines.

6.8 Toxicity evaluation. The NMCPHC requires sufficient information to permit an HHA of the product. Upon completion of the HHA, a copy will be provided by the NMCPHC to the Government for evaluation. The HHA process is described on the NMCPHC's website, <http://www.med.navy.mil/sites/nmcphc/industrial-hygiene/Pages/health-hazard-assessment.aspx>.

6.10 Subject term (key word) listing.

Carpet
Ceramic
Matting
Peel and Stick
Porcelain
Quarry
Rubber
Vinyl

CONCLUDING MATERIAL

Custodians:
Army – MI
Navy – SH
Air Force – 03

Preparing activity:
Navy – SH
(Project 7220-2019-004)

Review activities:
Army – AV, GL
Navy – CG
Air Force – 84
DLA – CQ

Civil agency:
GSA – FAS

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.dla.mil>.