

INCH-POUND
MIL-A-21016F
21 May 1990
SUPERSEDING
MIL-A-21016E
26 January 1967
(See 6 6)

MILITARY SPECIFICATION
ADHESIVE, RESILIENT DECK COVERING

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

1 SCOPE

1 1 Scope This specification establishes the requirements for the adhesive for securing resilient coverings to decks

2 APPLICABLE DOCUMENTS

2 1 Government documents

2 1 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 listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6 2)

SPECIFICATIONS

FEDERAL

- PPP-C-96 - Cans, Metal, 28 Gage and Lighter
- PPP-F-320 - Fiberboard Corrugated and Solid, Sheet Stock (Container Grade), and Cut Shapes
- PPP-P-704 - Pails, Metal (Shipping, Steel, 1 Through 12 Gallons)

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to Commander, Naval Sea Systems Command, SEA 5523, Department of the Navy, Washington, DC 20362-5101 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter

MIL-A-210161

MILITARY

- MIL-T-18830 - Tile, Plastic, Fire-Retardant
- MIL-L-19140 - Lumber and Plywood, Fire-Retardant Treated
- MIL-A-21366 - Adhesive, for Bonding Plastic Table Top Material to Aluminum

STANDARDS

FEDERAL

- FED-STD-313 - Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities

MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
- MIL-STD-129 - Marking for Shipment and Storage
- MIL-STD-147 - Palletized Unit Loads

(Unless otherwise indicated copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094)

2 1 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 are those cited in the solicitation

DEPARTMENT OF LABOR

- Occupational Safety and Health Administration (OSHA)
- Code of Federal Regulations (CFR)
- Title 29, Part 1910 Section 1200

(Application for copies should be addressed to Occupational Safety and Health Administration, Office of Publications, 200 Constitution Avenue N W , Room N3101, Washington, DC 20210)

2 2 Non-Government publications The following document forms a part of this document to the extent specified herein Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6 2)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- D 1849 - Standard Test Method for Packaging Stability of Paint
- D 3951 - Standard Practice for Commercial Packaging

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103)

MIL.-A-21016F

(Non-Government standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence 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 Material The adhesive shall be a waterbase latex free of all ingredients which may affect the serviceability or have a deleterious effect on metal, resilient deck covering and deck underlayment.

3.1.1 General requirement. The adhesive shall be free from grits, lumps, and skins, and shall be suitable for application with a trowel (see 4.4.1). It shall be suitable and effective for the purpose intended without heating or addition of other ingredients.

3.1.2 Stability The adhesive shall not liver, settle, or otherwise deteriorate (see 4.4.2).

3.1.3 Prohibited fibers Neither asbestos nor ceramic (refractor) fibers nor materials containing any of these fibers shall be used in the adhesive formulation (see 6.3).

3.2 Edge adhesive strength. The adhesive shall have edge adhesive strengths not less than those specified in table I (see 4.4.3).

TABLE I. Edge adhesive strength

Drying time (hours)	Type of tile	Load at separation (pounds)
1	Plastic	15
96	Plastic	7.5

3.3 Edge adhesive strength after water immersion The adhesive shall have edge adhesive strengths not less than 6 pounds (see 4.4.4).

3.4 Corrosion of metal The adhesive shall not corrode metal (see 4.4.5).

3.5 Viscosity The viscosity of the adhesive shall be not less than 20,000 centipoises (see 4.4.6).

MIL-A-21016F

3.6 Marking Each container of material shall be provided with a label giving adequate instructions for its use and application

3.7 Material safety data sheets The manufacturer shall provide the contracting activity with a Material Safety Data Sheet (MSDS) at the time of contract award. The MSDS is Form OSHA-20, found in and part of FED-STD-313 (see 6.4) and 29 CFR 1910.1200, Hazard Communication. When FED-STD-313 is at variance with the CFR, 29 CFR 1910.1200 shall take precedence, modify and supplement FED-STD-313. The MSDS shall be included with each shipment of the material covered by this specification (see 6.4)

4 QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of the manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 Sampling for inspection Sampling for inspection shall be as specified in 4.2.1 through 4.2.3

4.2.1 Lot For purposes of inspection, a lot shall consist of all adhesive from one production batch offered for delivery at one time.

4.2.2 Sampling for examination of filled containers A random sample of filled containers shall be selected from each lot in accordance with MIL-STD-105 at inspection level I (see 4.3.1)

4.2.3 Sampling for tests From each lot, two containers shall be selected. From each of the containers, 2-quart samples shall be taken for the tests specified in 4.3.2

MIL-A-21016F

4.3 Quality conformance inspection. Quality conformance inspection shall be provided in accordance with table II. Quality conformance inspection shall be the contractor's responsibility with verification by the Defense Contract Administration Services Management Area (DCASMA) (see 6.3).

TABLE II. Quality conformance inspection.

Inspection	Requirement	Test method
Material	3 1 & 3 1 3	Visual and certification
Stability	3 1.2	4 4 2
Edge adhesive strength before water immersion	3 2	4.4 3
after water immersion	3 3	4 4 4
Corrosion	3 4	4 4 5
Viscosity	3.5	4.4 6
Markings	3 6	Visual

4.3 1 Examination of filled containers Each sample filled container selected in accordance with 4.2 2 shall be examined to verify compliance with this specification. Any container in the sample having defects (see 3 1 1) under required fill shall be cause for rejection, and if the number of defective containers in any sample exceeds the acceptance number for the appropriate sampling plan specified in MIL-STD-105, it shall be cause for rejection of the lot which it represents

4 3.2 Tests The sample specimens selected in accordance with 4 2 3 shall be separately subjected to the tests specified in 4 4 3, 4 4.4 and 4 4 6. If any one of the samples tested is found to be not in conformance with this specification, it shall be cause for rejection of the lot which it represents (see 6 3)

4 4 Test procedures. Test procedures and conditions shall be as specified in 4 4 1 through 4 4 6

4 4 1 Preparation of specimens Unless otherwise specified herein, plastic tile conforming to MIL-T-18830 shall be used in the test procedures of this specification. One-eighth inch ordinary strength steel plates shall be roughened using number 60 silicon carbide paper or equivalent and shall be free from mill scale, rust, and organic matter. The steel plates having square corners shall be cleaned with methylethyl ketone (MEK) before adhering the tiles. Uniformly apply the adhesive onto the steel plates using a floor trowel having 1/16 inch deep by 1/16 inch wide notches spaced 3/32 inch apart between adjacent edges of the notches. After exposing the adhesive to the air for a period of 12 ± 2 minutes, place the tile specimen on the plate and move it back and forth a distance of 1/4 to 1/2 inch. The tile shall then be rolled into firm contact (a minimum of 10

MIL-A-21016F

passes) with a 7-inch diameter roller weighing 10 pounds per inch of specimen width. Unless otherwise specified herein, all tests shall be conducted at a temperature of 70 ± 2 degrees Fahrenheit ($^{\circ}\text{F}$) and a relative humidity of 50 ± 5 percent (see 6.2).

4.4.2 Accelerated stability The adhesive shall resist 4 weeks of storage at 125°F in accordance with ASTM Method D 1849, note 2. After storage the compound shall be examined to determine conformance to 3.1.2.

4.4.3 Edge adhesive strength test Edge adhesive strength test shall be as specified in 4.4.3.1 through 4.4.3.3.

4.4.3.1 Preparation of specimens The wearing surfaces of 3-inch by 4-1/2 inch pieces of plastic tile shall be backed with 1/32-inch aluminum using a contact adhesive conforming to MIL-A-21366. After a proper bond between the aluminum and the wearing surface of the tiles has been ensured, the pieces of tile shall be secured to the steel plates in accordance with 4.4.1 in such a manner that a 1- by 3-inch portion of the tile extends beyond the edge of the plate. Support the extended portion of the tile with a 1/8-inch thick steel plate. The entire tile shall then be rolled to insure that the tile at the edge of the steel plate is securely bonded. The longer dimension of the specimen shall be in the machine direction of the tile.

4.4.3.2 Specimen groups The specimens shall be divided into two groups. One group shall be allowed to set for 1 hour prior to test, the second group for 96 hours.

4.4.3.3 Procedure The steel plate shall be securely fixed to a suitable testing machine (such as an Instron Tester). A 1/4 inch diameter rod shall be placed under the extended portion of the specimen and shall be raised (relative to the steel plate) in a direction perpendicular to the plane of the tile at a rate of 1 inch per minute in order to lift the tile away from the steel plate. The load at 1/8 inch separation of the tile from the plate shall be determined to the nearest 0.1 pound and shall be taken as the edge adhesive strength.

4.4.4 Edge adhesive strength after water immersion Specimens shall be prepared as specified in 4.4.3.1 and shall be allowed to set for 96 hours prior to test. Then the specimens shall be immersed horizontally under a 1 inch head of tap water at $70 \pm 2^{\circ}\text{F}$ for 48 hours. The specimens shall be removed from the water, blotted dry, and tested as specified in 4.4.3.3.

4.4.5 Corrosion of metal Steel plates, upon completion of the test specified in 4.4.4, shall be cleaned with a solvent until free of adhesive and immediately examined for rusting, pitting, or other evidence of corrosion.

4.4.6 Viscosity The viscosity of the adhesive shall be determined using a Brookfield viscosimeter operated at 20 revolutions per minute (r/min) using a spindle which will give a reading in the center area of the scale. The test shall be conducted at a temperature of $70 \pm 2^{\circ}\text{F}$ and the adhesive shall be preconditioned at this temperature a minimum of 3 hours immediately prior to testing.

MIL-A-21016F

4 5 Inspection of packaging Sample packs, and the inspection of the preservation, packing and marking for shipment, stowage and storage shall be in accordance with the requirements of section 5 and the documents specified therein

5. PACKAGING

(The packaging requirements specified herein apply only for direct Government acquisition.)

5 1 General5.1.1 Navy fire-retardant requirements

5.1.1.1 Lumber and plywood When specified (see 6.2), all lumber and plywood including laminated veneer material used in shipping container and pallet construction, members, blocking, bracing, and reinforcing shall be fire-retardant treated material conforming to MIL-L-19140 as follows

Levels A and B Type II - weather resistant
Category 1 - general use

Level C - Type I - non-weather resistant
Category 1 - general use

5 1 1.2 Fiberboard Fiberboard used in the construction of class-domestic, non-weather resistant fiberboard and cleated fiberboard boxes including interior packing forms shall meet the flamespread index and the specific optic density requirements of PPP-F-320 and amendment thereto

5 1.2 Unit pack quantity The adhesive shall be furnished in 1-gallon cans or 5-gallon pails as specified (see 6 2) for the level of preservation as specified (see 5 2)

5 2 Preservation Preservation shall be level A, C or commercial as specified (see 6 2)

5 2 1 Level A5 2 1 1 Unit containers

5 2 1 1 1 Cans Cans shall be multifriction top, type V class 2 of PPP-C-96 with exterior plan A coating

5 2 1 1.2 Pails Pails shall be lug cover type II of PPP-P-704

5 2 2 Commercial Commercial preservation (unit packs) shall be in accordance with ASTM D 3951

5 3 Packing Packing shall be level A, B, C, or commercial as specified (see 6 2)

MIL-A-21016F

5.3.1 Level A

5.3.1.1 Cans Cans shall be packed in wood, plywood, or wirebound containers, at the supplier's option, in accordance with the level A requirements of the appendix to PPP-C-96

5.3.1.2 Pails Pails are not required to be overpacked When specified (see 6.2), pails shall be palletized in accordance with MIL-STD-147

5.3.2 Level B

5.3.2.1 Cans Cans shall be packed in accordance with the level A requirements of the appendix to PPP-C-96 except that wood, plywood and wirebound boxes shall be of the domestic type or class Fiberboard boxes shall be provided with fiberboard top and pads Fiberboard box closure shall be in accordance with method V and reinforced with tape or non-metallic banding

5.3.2.2 Pails Pails are not required to be overpacked When specified (see 6.2), pails shall be palletized in accordance with MIL-STD-147

5.3.3 Level C

5.3.3.1 Cans Cans shall be packed in accordance with the level B requirements of the appendix to PPP-C-96 For Navy, unless otherwise specified (see 5.1.1.2 and 6.2), fiberboard boxes shall be of the Class-Domestic/Fire-Retardant including the interior packing forms (top and bottom pads) which are required Box closure shall be in accordance with method using pressure sensitive adhesive tape

5.3.3.2 Pails Pails are not required to be overpacked When specified (see 6.2) pails shall be palletized in accordance with MIL-STD-147

5.3.4 Commercial. Commercial packing requirements for cans and pails shall be in accordance with ASTM D 3951

5.4 Marking

5.4.1 Levels A, B, C, and commercial In addition to any special marking required (see 6.2 and 3.6) unit containers (cans and pails), shipping containers and palletized unit loads shall be marked in accordance with MIL-STD-129 Marking information shall include the date of manufacture, batch or lot number, bar coding, and storage limitations (temperature, relative humidity) Commercial marking shall be in accordance with ASTM D 3951 including the label specified in 3.6, date of manufacture, batch or lot number, bar coding, and storage limitations (temperature, relative humidity) In addition, containers shall be marked "Adhesive free of asbestos and ceramic (refractory) fibers", (see 3.1.3)

5.5 Material safety data sheet A copy of the material safety data sheet shall be attached to the shipping document for each destination (see 3.7)

MIL-A-21016F

6 NOTES

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

6.1 Intended use. This material is intended to secure resilient coverings to steel decks and to the underlayment of steel decks.

6.2 Acquisition requirements. Acquisition documents should specify the following.

- (a) Title, number, and date of this specification
- (b) Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2 1 1)
- (c) Inspection conditions other than specified herein (see 4 4 1)
- (d) When fire-retardant treated material is required (see 5 1 1 1)
- (e) Unit pack quantity required (see 5 1.2)
- (f) Level of preservation and level of packing required (see 5 2 and 5 3)
- (g) When palletization of pails is required (see 5 3 1 2, 5 3 2 2, and 5 3 3 2)
- (h) Special marking required (see 5 4 1)

6.3 Consideration of data requirements The following data requirements should be considered when this specification is applied on a contract. The applicable Data Item Descriptions (DID's) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/provided and that the DID's are tailored to reflect the requirements of the specific acquisition. To ensure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DoD FAR Supplement 27 475-1 exempts the requirement for a DD Form 1423.

<u>Reference Paragraph</u>	<u>DID Number</u>	<u>DID Title</u>	<u>Suggested Tailoring</u>
3 1 3 and 4 3 2	DI-E-2121	Certificate of compliance	-----
4 3	DI-T-2072	Test reports	-----

The above DID's were those cleared as of the date of this specification. The current issue of DoD 5010 12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DID's are cited on the DD Form 1423.

6.4 Material safety data sheet Contracting officers will identify those activities requiring copies of completed Material Safety Data Sheets prepared in accordance with FED-STD-313. The pertinent Government mailing address for submission of data are listed in appendix B of FED-STD-313. In order to obtain the MSDS, Federal Acquisition Regulation (FAR) clause 52 223-3 must be in the contract.

MIL-A-21016f

6 5 Subject term (key word) listing

Latex, waterbase
Underlayment, steel deck

6.6 Changes from previous issue Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes

Custodians

Army - Mk
Navy - SH
Air Force - 99

Preparing activity

Navy Gil
(Project 8040-0482)

Users

Navy - YD

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

- 1 The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
- 2 The submitter of this form must complete blocks 4, 5, 6, and 7.
- 3 The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

1 RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-A-21016F	2. DOCUMENT DATE (YYMMDD)
3. DOCUMENT TITLE ADHESIVE, RESILIENT DECK COVERING		
4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)		
5. REASON FOR RECOMMENDATION		
6. SUBMITTER		
a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (if applicable)	7. DATE SUBMITTED (YYMMDD)
8. PREPARING ACTIVITY		
a. NAME Technical Point of Contact (TPOC). Mr. Berry (SEA 05M1)	b. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON TPOC: 703-602-0215	
PLEASE ADDRESS ALL CORRESPONDENCE AS FOLLOWS:		
c. ADDRESS (Include Zip Code) Commander, Naval Sea Systems Command Department of the Navy (SEA 5572) Washington, DC 20362-5101	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT Defense Quality and Standardization Office 5203 Leesburg Pike Suite 1403, Falls Church VA 22041 3466 Telephone (703) 756-2340 AUTOVON 289-2340	