

MIL-D-23134(SHIPS)
17 January 1962

MILITARY SPECIFICATION

DECK UNDERLAY AND COVERING, INSULATING, MAGNESIA AGGREGATE MIXTURE

1. SCOPE

1.1 This specification covers insulation underlayment and deck covering for use over such areas aboard ship as ballast tanks and hot machinery spaces.

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids, form a part of this specification to the extent specified herein:

SPECIFICATION

MILITARY

MIL-A-1154 - Adhesive, Vulcanized Synthetic Rubber to Metal and to Vulcanized Synthetic Rubber Bonding.

STANDARD

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. - The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids shall apply.

AMERICAN SOCIETY FOR TESTING MATERIALS

C177-45 - Thermal Conductivity of Materials by Means of the Guarded Hot Plate, Standard Method of Test for.

(Application for copies should be addressed to the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa.)

OFFICIAL CLASSIFICATION COMMITTEE

Uniform Freight Classification Rules.

(Application for copies should be addressed to the Official Classification Committee, 1 Park Avenue at 33rd Street, New York 16, N. Y.)

3. REQUIREMENTS

3.1 Material. - The material shall consist essentially of a mixture of dry ingredients and a gaging solution of magnesium chloride proportioned to produce an insulating deck underlayment and covering which can be applied by a trowel. The material when trowelled shall produce a smooth surface relatively free from waves, trowel marks, depressions, and other surface defects.

3.1.1 Dry ingredients. - The dry ingredients, proportioned on a weight basis, shall be intimately premixed, and shall consist of finely ground caustic calcined magnesia, inert aggregates and insulating component.

3.1.2 Magnesium chloride. - The magnesium chloride shall be furnished in a dry flake form readily dissolvable in tap water to form the gaging solution, to which may be added a stabilizer if necessary.

3.2 Adhesion or bonding. - The covering shall be capable of adhering to the deck or structure on which applied without the use of clips or other devices welded to the deck.

3.3 Weight. - The covering after drying shall not exceed 1.10 pounds per square foot for a thickness of 1/4 inch (see 4.4.2).

3.4 Indentation. - The initial indentation of the covering shall not exceed 4.5 percent of the actual thickness of the covering. The covering shall show no signs of cracking or becoming detached from the steel base as the result of the indentation (see 4.4.3).

3.5 Water absorption. - The covering shall not absorb more than 20.0 percent of water, based on its weight at normal atmospheric conditions (see 4.4.4).

3.6 Resistance to impact. - The covering shall show no visible signs of chipping, cracking, or detachment from the steel plate. There shall not be more than 1/8 inch of permanent indentation (see 4.4.5).

3.7 Bond strength in shear. - The initial bond strength in shear when bonded to steel shall not be less than 50 pounds per square inch (see 4.4.6).

3.8 Thermal conductivity. - The thermal conductivity (k) shall not exceed 1.00 British thermal units (B.t.u.) per square foot per hour per degree

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Fahrenheit (°F.) for a thickness of one inch at a mean temperature of 75°F. (see 4.4.7).

3.9 Directions for application. - Each container shall be clearly labeled with instructions for application of the covering.

3.10 Workmanship. - The workmanship shall be first class in every respect.

4. QUALITY ASSURANCE PROVISIONS

4.1 Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. The government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Sampling for acceptance inspection. -

4.2.1 Lot. - For purposes of sampling, a lot shall consist of all unmixed ingredients (dry ingredients and magnesium chloride flakes) 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 offered for examination in accordance with MIL-STD-105 at inspection level I and acceptance quality level of 2.5 percent defective to verify compliance with this specification in regard to fill, closure, and marking. Each type container shall be sampled separately (see 4.3.1).

4.2.3 Sampling for tests. - From each inspection lot, a sample of unmixed ingredients shall be selected in accordance with table I. Each sample shall consist of sufficient premixed dry ingredients (finish coat) and magnesium chloride flakes for the tests specified in 4.3.2.

4.3 Examination and tests. -

4.3.1 Examination of filled containers. - Each sample filled container selected as specified in 4.2.2 shall be examined for defects of construction of the container and the closure, for evidence of leakage, and for unsatisfactory markings; each filled container shall also be weighed to determine the amount of contents. Any filled container in the sample having one or more defects, or under required fill, shall be rejected, and if the number of defective containers in any sample exceeds the acceptance number for the appropriate sampling plan of MIL-STD-105, the lot represented by the sample shall be rejected.

4.3.2 Lot acceptance tests. - The dry ingredients and the magnesium chloride flakes selected in accordance with 4.2.3 shall be mixed (separately for each

container) in accordance with the manufacturer's instructions, and subjected separately to the tests specified in 4.4.2 through 4.4.6. When specified (see 6.2), the performance test specified in 4.4.7 shall also be conducted. If the sample is found to be not in conformance with this specification, the entire lot shall be rejected.

4.3.2.1 Small lots. - Tests shall be omitted when the lot consists of 2,000 pounds or less.

4.4 Test procedures. -

4.4.1 Preparation of specimens. - Unless otherwise specified, specimens of the sizes required for the following tests shall be made of clean 1/8-inch thick mild steel plates. The plates shall be primed with a brush coat of adhesive conforming to MIL-A-1154 and allowed to dry for 2 hours. The covering shall be prepared with the manufacturer's instructions, using a gaging solution of 21.5 plus or minus 0.5 degrees Baume, and trowelled on the primed steel plates to a thickness of approximately 1/2 inch by means of templates. The specimens shall then be cured for 96 hours at room temperature before conducting tests. Except as specified herein, all tests shall be conducted at a temperature of 70 to 75°F. and a relative humidity of 50 plus or minus 2 percent.

4.4.2 Weight. - The covering shall be applied to three 6-inch square steel plates (see 4.4.1) which have been previously measured, and weighed to the nearest 0.01 gram. The length and width shall be measured to the nearest 0.01 inch, and the thickness to the nearest 0.001 inch. The thickness shall be determined by measuring the steel plates with and without the covering, at 16 equally distributed points on the specimen, by means of a dial thickness gage and a template. The difference in thickness of the steel plate and the coated steel plate shall be averaged to determine the thickness of the material. From the difference between the weights of the coated steel, the actual weight of the material shall be determined and then computed in pounds per square foot per 1/2 inch thickness. The final computed weight shall be the average of the three specimens.

4.4.3 Indentation. - One specimen 6 inches square shall be used, including the full thickness of the covering and steel base to which it was applied (see 4.4.1). Three indentations shall be made on the specimen and the results averaged. The center of each indentation shall be not less than 1-1/2 inches from the edge of the specimen, and not less than 2-1/2 inches from the center of the adjoining indentation.

4.4.3.1 A load of 2,000 pounds shall be applied on the deck covering for 30 minutes by means of a circular indenter with a cross-sectional area of 1

square inch and a radius of 1/64 inch on the perimeter of the indenting flat face. The thickness of the covering shall be measured with a micrometer dial gage using a 4 ounce weight and 1/4 inch diameter flat foot on both sides of the specimen before and after the 2,000 pound load has been applied, and the thickness of the steel base shall be subtracted in each case.

4.4.3.2 The indentation shall be taken as the percent change in the thickness of the material.

4.4.4 Water absorption. - Three specimens 2 inches square by 1/4-inch thick shall be prepared by

applying the surfacing to oiled surfaces of steel plate, in such a manner that upon drying the specimens will not adhere to the plates. Each specimen without the steel backing plate shall be weighed dry, dipped into tap water at room temperature, lightly wiped on all surfaces with a paper towel and again weighed to the nearest 0.01 gm. Immediately after weighing, the specimen shall again be immersed in the tap water for 24 hours, lightly wiped and again weighed. The percent gain in water shall be based on the weight of the dry specimen and the difference between the weight after 24 hours immersion and weight after dipping and wiping.

Table I - Sampling for tests.

Lot size in pounds	Number of samples
500 and under	None
501 to 1,500	2
1,501 to 4,000	3
4,001 to 8,000	4
8,001 to 15,000	5
15,001 to 25,000	6
25,001 to 40,000	7
40,001 to 60,000	8
60,001 to 90,000	9
90,001 to 120,000	10
120,001 to 200,000	12
200,001 to 300,000	14
300,001 and over	16

4.4.5 Resistance to impact. - Two specimens 6 inches square shall be used, including the full thickness of the covering and the steel base (see 4.4.1). Each specimen shall be tested separately while being firmly held on a solid-horizontal base. A 2-pound ball shall be dropped vertically from a height of 8 feet so that the impact will be at the center of the specimen. Each specimen shall be subjected to two impacts of the ball.

4.4.6 Bond strength in shear. - Six specimens shall be prepared by applying the covering on 2 by 2 by 1/8-inch thick mild steel plate to a thickness of 1/4 inch by means of a template, such that 1 inch of the steel base is exposed at one end, and 3 inches exposed at the opposite end. Specimens shall be tested by measuring the load required to shear the 2-inch square area of the covering from the steel plate by means of a shear test jig as shown on figure 1.

4.4.7 Thermal conductivity. - Thermal conductivity shall be determined in accordance with ASTM Standard C177-45.

5. PREPARATION FOR DELIVERY

5.1 Domestic shipment and early material use.

5.1.1 Packing. - Packing shall be accomplished in a manner which will insure acceptance by common carrier and will afford protection against physical damage during direct shipment from the supply source to the using activity for early use. The shipping containers or method of packing shall conform to the Uniform Freight Classification Rules and Regulations or other carrier regulations as applicable to the mode of transportation.

5.1.2 Marking. - Shipment marking information shall be provided on interior packages and exterior shipping containers in accordance with the contractor's commercial practice. The information shall include nomenclature, Federal stock number or manufacturer's part number, contract or order number, contractor's name and destination.

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6 NOTES

6.1 The covering under this specification is intended for use as an insulating underlay or decking in ship spaces such as living, wardroom, and storage over ballast tanks, and hot machinery spaces.

6.2 Ordering data. - Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Whether thermal conductivity test is required (see 4.3.2).

6.3 The material should be purchased by weight.

Notice. - When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Preparing activity:

Navy - Ships

(Project 5610-N015Sh)

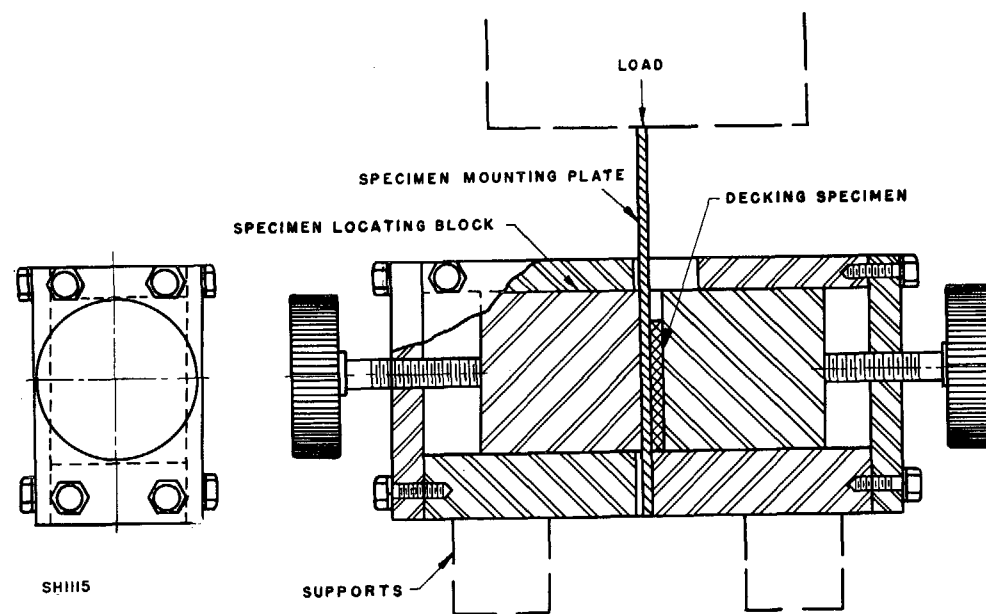


FIGURE 1 - Shear test jig.

SPECIFICATION ANALYSIS SHEET
NAVSHIPS-4863 (8-61)
INSTRUCTIONS
BUDGET BU. NO. 45-R309

This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Bureau of Ships

This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured

with a minimum amount of delay and at the least cost.

Comments and the return of this form will be appreciated.

Fold on dotted lines on reverse side, staple in corner, and send to Bureau of Ships, Specifications and Standardization Branch, Washington 25, D.C.

SPECIFICATION
ORGANIZATION
CITY
STATE
CONTRACT NO.
QUANTITY OF ITEMS PROCURED
DOLLAR AMOUNT
\$
MATERIAL PROCURED UNDER A DIRECT GOVERNMENT CONTRACT
OR A SUBCONTRACT
1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?
A. GIVE PARAGRAPH NUMBER AND WORDING
B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES.
2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID.
3. IS THE SPECIFICATION RESTRICTIVE?
IF THE ANSWER IS "YES", IN WHAT WAY?
YES
NO
4. REMARKS (Attach any pertinent data which may be of use in improving this specification.) PLACE THIS FORM AND PAPERS IN AN ENVELOPE AND SEND TO THE BUREAU.
SUBMITTED BY (Print name and activity)
DATE