MIL-M-15562D(NAVY)
17 June 1974
SUPERSEDING
MIL-M-15562C(NAVY)
30 August 1963
(See 6.4)

MILITARY SPECIFICATION

MATTING, FLOOR, RUBBER, INSULATING FOR HIGH VOLTAGE APPLICATION

This specification is approved for use by interested commands of the Department of the Navy and the Marine Corps and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 This specification covers rubber matting for use around electrical apparatus or circuits as a safety measure to protect personnel from potential electric grounds not exceeding 3000 volts. Equipment operating at higher voltages shall utilize other built-in safety measures to provide personnel protection.

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of the specification to the extent specified herein.

SPECIFICATION

MILITARY
MIL-T-40625 - Tubing, Bias Sewn (Burlap or Osnaburg) Cloth.

STANDARDS

FEDERAL
FED-STD-595 - Colors.
FED-STD-601 - Rubber: Sampling and Testing.

MILITARY
MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129 - Marking for Shipment and Storage.
MIL-STD-407 - Visual Inspection Guide for Rubber Molded Items.

(Copies of specifications, standards, drawings, and publications required by suppliers 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 or request for proposal shall apply.

UNIFORM CLASSIFICATION COMMITTEE, AGENT
Uniform Freight Classification Rules.

(Application for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, Illinois 60606.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
D412-68 - Tension Testing of Vulcanized Rubber.
E162-67 - Surface Flammability of Materials Using A Radiant Heat Energy Source, Test For.

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

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

3.1 Sample for first article inspection. Prior to beginning production, a sample shall be tested as specified in 4.3 (see 6.2).

3.2 Material. The matting shall be made from a compound utilizing synthetic rubber, reclaimed rubber, or a combination thereof. In compounding the matting, the use of ingredients which would tend to emit objectionable odors in service are prohibited.

3.3 Construction. The matting shall have one or more cotton-fabric inserts. The back of the matting shall be finished with a cloth imprint.

3.3.1 Surface. The upper surface shall have a smooth surface finish.

3.3.2 Fabric. The fabric shall be evenly and firmly woven from a good quality cotton and shall weigh not less than 4-3/4 ounces per square yard. It shall be free from defects and dirt, knots, lumps, and irregularities of twist.

3.4 Thickness. The overall thickness of the matting shall be 0.1875 $\pm$0.02 inch.

3.5 Size. Matting shall be of the width and roll length specified (see 6.1.1).

3.6 Color. The color shall correspond to black, numbers 37038 or 37056; to gray, number 36231; or green, number 14223 of FED-STD-595, or be as specified (see 6.1.1). Each color shall be tested separately to determine conformity with all the requirements of this specification.

3.7 Tensile strength.

3.7.1 As-received condition (initial). The tensile strength of the matting in the as-received condition shall be not less than 1200 pounds per square inch gage (lb/in^2g), when tested as specified in 4.8.1.

3.7.2 After immersion in sulfuric acid. The matting, after being subjected to the immersion test specified in 4.8.2, shall have a tensile strength of at least 70 percent of the initial tensile strength.

3.7.3 After oxygen bomb aging. The matting, after being subjected to the test specified in 4.8.3, shall have a tensile strength of at least 80 percent of the initial tensile strength.

3.7.4 After light aging. The matting, after exposure to the light aging test specified in 4.8.4, shall have a tensile strength of at least 65 percent of the initial tensile strength.

3.8 Ultimate elongation. The ultimate elongation shall be not less than 300 percent when tested as specified in 4.8.5.

3.9 Permanent set. The permanent set shall be not greater than 25 percent when tested as specified in 4.8.6.

3.10 Hardness. The matting shall have a hardness indentation of not less than 0.50 millimeter (mm) when tested as specified in 4.8.7.

3.11 Friction (adhesion). The adhesion of the fabric insert to the rubber shall be such that a weight of 4 pounds applied to a test strip 1 inch wide shall cause separation at a rate not greater than 1 inch per minute when tested as specified in 4.8.8.

3.12 Flexibility. The matting shall not crack nor show any indication of weakness when tested as specified in 4.8.9.

3.13 Voltage. The matting shall not puncture, become appreciably warm at any spot, nor show any other sign of weakness when tested as specified in 4.8.10.

3.14 Dielectric strength. The matting shall not fail at less than 30,000 volts when tested as specified in 4.8.11.

3.15 Fire resistance. The matting shall have a flame spread index of not more than 25 when tested as specified in 4.8.12.

3.16 Identification marking. The matting shall be permanently and legibly marked on the backside, in not less than 6 foot increments, with the name of the manufacturer or his registered trademark, specification number, date of curing, and the amount of voltage the matting has been tested to resist.

3.17 Workmanship. The occurrence of defects in the matting shall not exceed the applicable acceptable quality levels when visually and dimensionally examined as specified in 4.4.1.1.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier 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 assure supplies and services conform to prescribed requirements.

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

(a) First article inspection (see 4.3).
(b) Quality conformance inspection (see 4.4).

4.3 First article inspection. First article inspection shall consist of the examinations and tests specified in table I.

Table I - First article tests.

Tests	Paragraph	
	Requirement	Test
Tensile strength	3.7	4.8.1
Immersion	3.7.2	4.8.2
Oxygen bomb aging	3.7.3	4.8.3
Light aging	3.7.4	4.8.4
Ultimate elongation	3.8	4.8.5
Permanent set	3.9	4.8.6
Hardness	3.10	4.8.7
Friction (adhesion)	3.11	4.8.8
Flexibility	3.12	4.8.9
Voltage	3.13	4.8.10
Dielectric strength	3.14	4.8.11
Fire resistance	3.15	4.8.12

4.3.1 First article test report. The supplier shall prepare a first article test report in accordance with the data ordering document included in the contract or order (see 6.1.2).

4.4 Quality conformance inspection.

4.4.1 Lot. A lot shall consist of not more than 100 rolls of matting of one width, offered for delivery at one time.

4.4.2 Sampling for quality conformance inspection.

4.4.2.1 Matting. A random sample of rolls of matting shall be selected in accordance with table II from each inspection lot, with lot acceptance based on the following sampling requirements in accordance with MIL-STD-105.

Table II - Sampling for inspection AQL (approx.) = 2.5 percent defective.

Number of rolls of matting in lot	Number of rolls of matting in sample	Acceptance number (defectives)	Rejection number (defectives)
8 or under	5	0	1
9 to 15	7	0	1
16 to 40	10	0	1
41 to 65	15	1	2
66 to 100	25	1	2

4.4.2.2 Fabric. The contractor shall furnish with each lot 1 foot of fabric the full width of the rubber matting, which he shall guarantee to be identical in material and weave with the fabric used in the lot.

4.4.3 Sampling for quality conformance tests. For the tests specified in 4.6, a 2-square-foot sample shall be taken from each of four of the sample rolls of matting selected from each lot in accordance with 4.4.2.1. If the lot contains less than four rolls, each roll shall be sampled.

4.4.4 Sampling for production check tests. With the first lot of material offered for delivery under a contract or order, and normally, once thereafter for every 10 lots which have passed quality conformance inspection, sufficient material shall be taken from each of the sample rolls selected as specified in 4.4.3 for the production check tests specified in 4.7.

4.4.5 Visual and dimensional examination.

4.4.5.1 Matting. Each of the sample rolls of matting selected in accordance with table II shall be visually and dimensionally examined to verify compliance with 3.4, 3.5, 3.6 and 3.16. The surfaces shall be examined for the visual defects described in MIL-STD-407 to determine conformance with 3.17. Any roll of matting in the sample containing one or more visual or dimensional defects shall be cause for rejection, and if the number of defective rolls of matting in any sample exceeds the acceptance number for that sample, it shall be cause for rejection of the lot represented by that sample.

4.4.5.2 Fabric. Each of the samples furnished in accordance with 4.4.2.2 shall be surface examined and weight in ounces per square yard determined for compliance with 3.3.2.

4.6 Quality conformance tests. Each of the samples selected in accordance with 4.4.3 shall be subjected to the following tests:

Test	Paragraph
Tensile strength (initial only)	4.8.1
Ultimate elongation	4.8.5
Permanent set	4.8.6
Hardness	4.8.7
Friction (adhesion)	4.8.8
Flexibility	4.8.9
Dielectric strength	4.8.11

4.6.1 Action in case of failure. If any one of the samples representing a lot fails to pass one or more tests specified in 4.6, it shall be cause for rejection of the entire lot.

4.6.2 Voltage. The voltage test specified in 4.8.10 shall be made on the entire area of matting offered for delivery. Any roll of matting which does not pass the voltage test shall be cause for rejection.

4.7 Production check tests. Each of the samples selected in accordance with 4.4.4 shall be subjected to the following tests:

Test	Paragraph
Tensile strength	
after immersion	4.8.2
# after oxygen bomb aging	4.8.3
after light aging	4.8.4
Fire resistance	4.8.12

4.7.1 Action in case of failure. If a sample selected in accordance with 4.4.4 fails any of the tests specified in 4.7, it shall be cause for rejection of the lot.

4.8 Test procedures. The tests specified in 4.8.1 through 4.8.6 shall be conducted on rubber stripped from the cotton fabric. The tests specified in 4.8.7 through 4.8.12 shall be conducted on the complete matting. Unless otherwise specified (see 6.1.1) all specimens shall be conditioned for at least 16 hours at 80° +9° Fahrenheit (F) (26.7° +4.1° Celsius (C)) before being tested, and the tests shall be performed within this temperature range.

4.8.1 Tensile strength. Tensile strength shall be determined in accordance with method 4111 of FED-STD-601 using a number III die for preparing dumbbell specimens.

4.8.2 Immersion test. Three dumbbell rubber test specimens of the size specified in 4.8.1 shall be used. Both sides of the specimens shall be buffed. The specimens shall be immersed and tested for tensile strength in accordance with method 6121 of FED-STD-601. The immersion medium shall be a 20 percent by weight sulfuric acid solution and the immersion temperature shall be 70° ±1°C (158° ±1.8°F). After immersion, the specimens shall be removed, rinsed lightly with water at room temperature, and blotted lightly with filter paper. The specimens shall then be suspended or placed on a screen and allowed to dry at room temperature in air protected from drafts, for 2 hours, after which the tensile strength shall be determined. In calculations of the tensile strength, measurements for cross sectional area shall be taken after immersion and drying of the specimens.

4.8.3 Oxygen bomb aging test. Three dumbbell rubber test specimens of size specified in 4.8.1 shall be subjected to the oxygen bomb aging test in accordance with method 7111 of FED-STD-601 and then tested for tensile strength. The aging period shall be for 46 ±1/4 hours.

4.8.4 Light aging. Three dumbbell rubber test specimens of the size specified in 4.8.1 shall be subjected to light aging in accordance with method 7311 of FED-STD-601 and then tested for tensile strength. The aging method, however, should be modified as follows:

Exposure for 25 hours shall be made at 10 percent elongation, using "Ever-ready Sunshine" carbons or equal or other method satisfactory to the command or agency concerned. Total dosage in decomposition of oxalic acid by uranyl oxalate actinometer shall be a minimum of 0.5 by 10^4 milligrams (mg) per square decimeter.

4.8.5 Ultimate elongation. Ultimate elongation shall be determined in accordance with ASTM D412-68, using die C for preparing dumbbell specimens. Specimen thickness shall be as specified in 3.4.

4.8.6 Permanent set. Permanent set shall be determined in accordance with ASTM D412-68. The specimens shall be elongated 100 percent in the test. Specimen thickness shall be as specified in 3.4.

4.8.7 Hardness. Hardness shall be determined in accordance with method 3031 of FED-STD-601 using a spherical steel point 0.1250 ±0.0005 inch in diameter. Matting shall be plied to give a minimum thickness of 1/4 inch for making the hardness determination.

4.8.8 Friction (adhesion). The adhesion of the fabric to the rubber shall be determined in accordance with method 8011 of FED-STD-601.

4.8.9 Flexibility. The matting shall be doubled and pressed flat on itself in any direction for 5 minutes with the smooth surface outside.

4.8.10 Voltage. The matting shall be tested between electrodes consisting of rectangular metal sheets, having smoothly rounded edges and corners, and of any convenient length. The width shall be such that arcing around the edges of the matting will not occur. The tests shall be made progressively until the entire test area of the matting has been covered, 15,000 volts being applied for 1 minute at each position of the electrodes. The contact pressure of the electrodes shall be adequate to obtain good electrode contact with the test specimen.

4.8.11 Dielectric strength. Specimens shall be tested to failure in air between 2-inch disk electrodes with edges rounded to a radius of 1/4 inch. The voltage shall be applied at the rate specified in 4.8.11.1.4. The test specimen shall be a minimum of 1 square foot in area and there shall be a minimum of five measurements made with no two measurements being less than 4 inches apart.

4.8.11.1 Test voltage.

4.8.11.1.1 Source. The test voltage shall be obtained from test equipment, no part of which has a capacity of less than 1/2 kilovoltampere (kVA) per square foot of electrode surface. In no case shall the rating of any part of the test apparatus be less than 5 kVA. The frequency of the test voltage shall be not more than 65 hertz (Hz).

4.8.11.1.2 Regulation. The method of regulating the test voltage shall be one which does not distort the waveform of the test voltage from a sine wave. Acceptable methods include:

(a) Field regulation of the alternator supplying the transformer.
(b) Induction type regulator.
(c) Variable-ratio-transformer type of regulator.
(d) Potentiometer type of rheostatic control where the current in the portion of the potentiometer resistance in parallel with the primary transformer is at least five times the exciting current of the transformer.

4.8.11.1.3 Measurement. The test voltage shall be measured by one of the following methods:

(a) A properly calibrated electrostatic voltmeter connected directly across the matting under test.
(b) Any properly calibrated commercial type of alternating current voltmeter connected to the low-tension side of the transformer in conjunction with the ratio of transformation of the transformer, provided that the ratio is definitely known for all test conditions.

4.8.11.1.4 Application. The potential shall be applied at a low value and gradually and steadily raised at the rate of 800 to 1,000 volts per second until the prescribed testing voltage is reached.

4.8.12 Fire resistance. The matting shall be tested in accordance with ASTM E162-67, except that three specimens shall be tested and the average value for flame spread index shall be reported.

4.9 Inspection of preparation for delivery. The packaging, packing, and marking shall be inspected for compliance with section 5 of this document.

5. PREPARATION FOR DELIVERY

(The preparation for delivery requirements specified herein apply only for direct Government procurements. For the extent of applicability of the preparation for delivery requirements of referenced documents listed in section 2, see 6.3.)

5.1 Packaging. Packaging shall be level A or C as specified (see 6.1.1).

5.1.1 Level A. Matting shall be tightly rolled, and securely tied or strapped to prevent unrolling. Rolls shall then be wrapped with not less than two thicknesses of 60-pound minimum basis weight waterproof kraft paper, secured with not less than 2-inch wide, 60-pound basis weight waterproof gummed tape.

5.1.2 Level C. Packaging of rolls (see 3.5), shall be sufficient to afford adequate protection against deterioration and physical damage during shipment from the supply source to the using activity and until early use. Packaging may conform to the supplier's commercial practice when such meets the requirements specified.

5.2 Packing. Packing shall be level A, B, or C as specified (see 6.1.1).

5.2.1 Levels A and B. Each roll packaged as specified (see 6.1.1), shall be inserted into a bias-sewn tubing or bag constructed of class 2 or 3 burlap, cloth, jute (or kenaf), or cotton osnaburg cloth in accordance with MIL-T-40625. Each end shall be closed with two wire ties. The first tie shall be applied as close as possible to the tubing or bag at the base which is formed by gathering the material evenly together. The second wire tie shall be applied approximately 1 inch from the first tie with the twisted ends positioned opposite to those of the first wire tie. Wire ties shall be not less than 6 inches long, 0.072 inch diameter, soft iron or steel, with a formed eye at each end, approximately 1/2 inch in diameter.

5.2.2 Level C. Packing shall be accomplished in a manner which will insure acceptance by common carrier and will afford protection against physical or mechanical 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 or other carrier regulations as applicable to the mode of transportation and may conform to the supplier's commercial practice when such meets the requirements specified.

5.3 Marking. In addition to any special marking required, (see 6.1.1), interior packages and exterior shipping containers shall be marked in accordance with MIL-STD-129 and in addition shall be marked with the date cured.

6. NOTES

6.1 Ordering data. Procurement documents should specify:

6.1.1 Procurement requirements.

(a) Title, number, and date of this specification.
(b) Width and length of roll required (see 3.5).
(c) Color required (see 3.6).
(d) Conditioning of specimens, if other than specified (see 4.8).
(e) Level of packaging and level of packing (see 5.1 and 5.2).
(f) Special marking, if required (see 5.3).

6.1.2 Contract data requirements. When this specification is used in a procurement invoking the data requirement clause of the Armed Services Procurement Regulations (ASPR) paragraph 7-104.9(n) and which incorporates a DD Form 1423 Contract Data Requirements List (CDRL), the data requirements identified below will be developed as specified in the cited Data Item Description (DID) and delivered in accordance with such CDRL. When the ASPR provisions are not invoked, the data specified below shall be delivered in accordance with the contract requirements.

Specification paragraph	Data requirements	Service	Applicable DID	Options
4.3.1	First article test report	SH	UDI-T-23450	

(Copies of DID's required by the supplier in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer. Unless otherwise specified, the issue in effect on date of invitation for bids or request for proposal shall apply.)

6.2 First article inspection.

6.2.1 Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection as to those bidders offering a product which has been previously procured or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending procurement.

6.3 Subcontracted material and parts. The preparation for delivery requirements of referenced documents listed in section 2 do not apply when material and parts are procured by the supplier for incorporation into the equipment and lose their separate identity when the equipment is shipped.

6.4 THE MARGINS OF THIS SPECIFICATION ARE MARKED "#" TO INDICATE WHERE CHANGES (ADDITIONS, MODIFICATIONS, CORRECTIONS, DELETIONS) FROM THE PREVIOUS ISSUE HAVE BEEN MADE. THIS WAS DONE AS A CONVENIENCE ONLY AND THE GOVERNMENT ASSUMES NO LIABILITY WHATSOEVER FOR ANY INACCURACIES IN THESE NOTATIONS. BIDDERS AND CONTRACTORS ARE CAUTIONED TO EVALUATE THE REQUIREMENTS OF THIS DOCUMENT BASED ON THE ENTIRE CONTENT IRRESPECTIVE OF THE MARGINAL NOTATIONS AND RELATIONSHIP TO THE LAST PREVIOUS ISSUE.

Other interest:
Review - AS, YD
User - OS, MC, CG

Preparing activity:
Navy - SH
(Project 7220-N067)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

OMB Approval No. 22-R255

INSTRUCTIONS: The purpose of this form is to solicit beneficial comments which will help achieve procurement of suitable products at reasonable cost and minimum delay, or will otherwise enhance use of the document. DoD contractors, government activities, or manufacturers/vendors who are prospective suppliers of the product are invited to submit comments to the government. Fold on lines on reverse side, staple in corner, and send to preparing activity. 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. Attach any pertinent data which may be of use in improving this document. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity.

DOCUMENT IDENTIFIER AND TITLE

NAME OF ORGANIZATION AND ADDRESS

CONTRACT NUMBER

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY DOCUMENT REQUIREMENT CONSIDERED TOO RIGID

3. IS THE DOCUMENT RESTRICTIVE?

☐ YES ☐ NO *(If "Yes", in what way?)*

4. REMARKS

SUBMITTED BY *(Printed or typed name and address - Optional)*

TELEPHONE NO.

DATE

DD FORM 1 JAN 72 1426 REPLACES EDITION OF 1 JAN 66 WHICH MAY BE USED

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