MIL-I-15475B(SHIPS)
16 March 1962
SUPERSEDING
MIL-I-15475A(SHIPS)
30 July 1954

MILITARY SPECIFICATION

INSULATION FELT, THERMAL, FIBROUS GLASS, SEMIRIGID

1. SCOPE

1.1 This specification covers fibrous glass felt for insulating ship boiler uptakes. (See 6.2.)

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-P-116 - Preservation, Methods of.

STANDARDS

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

(Copies of specifications, standards, drawings, and publications required by the 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
ASTM C-167-50 - Thickness and Density of Blanket or Batt-Type Thermal Insulation Materials.
ASTM C-177-45 - Thermal Conductivity of Materials by Means of the Guarded Hotplate, 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 of glass fibers bonded with a suitable binder to form semirigid sheets.

3.2 Dimensions. -

3.2.1 Length. - Unless otherwise specified in the contract or order, the length of the sheets shall be 48 inches, plus 3/8-inch, or minus 1/8-inch.

3.2.2 Width. - Unless otherwise specified in the contract or order, the width of the sheets shall be 24 or 30 inches, plus 3/8-inch, or minus 1/8-inch (see 6.1).

3.3 Thickness and weight. - Glass fibrous sheets shall be furnished in the thicknesses and weights shown in table I, as specified (see 6.1), and shall not vary more than 15 percent from the respective weight for the ordered thickness. A tolerance of plus or minus 1/8-inch will be permitted in thickness (see 4.4.1).

Table I - Thickness and weight.

Thickness	Weight per square foot
Inches	Ounces
1	4
1-1/2	6
2	8
3	12
4	16

3.4 Fineness of fibers. - The diameter of individual fibers shall average not more than 0.0008 inch. The maximum diameter of any fiber shall be not more than 0.0015 inch (see 4.4.2).

3.5 Resistance to vibration. - There shall be no sagging or settling of the material when subjected to the vibration test for a period of 100 hours (see 4.4.3).

3.6 Alkalinity. - The alkalinity of the finished material expressed as sodium oxide (Na_2O) shall not exceed 0.60 percent (see 4.4.4).

3.7 Fusing temperature. - The fusing temperature of the fibers shall be not less than 1250° Fahrenheit (F.) (see 4.4.5).

3.8 Thermal conductivity. - The conductivity (k) in British thermal unit inch per hour square foot degrees F. shall not exceed the values, at the mean temperature listed (see 4.4.6):

Mean temperature °F.	(k)
75	.28
150	.35
350	.61

3.9 Nonfibrous (shot) content. - Fibers shall contain not more than 20.0 percent, by weight, of shot (nonfibrous material) (see 4.4.7).

3.10 Workmanship. - The workmanship shall be first class, and the insulation shall not have visible defects that will affect, adversely, the service qualities.

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. -

4.2.1 Inspection lot. - For purposes of sampling a lot shall consist of insulation felt of the same size and thickness produced in one plant under essentially the same conditions and offered for delivery.

4.2.2 Sampling for visual and dimensional examination. - Sample sheets shall be selected from each lot of insulation for the examination specified in 4.3.1, with lot acceptance based on table II, and MIL-STD-105.

4.2.3 Sampling for lot acceptance tests. - From each lot, 7 pieces 24 by 48 or 30 by 48 inches shall be selected at random for the test specified in 4.3.2. Each specimen shall be taken from a different sheet.

4.3 Examination and tests. -

4.3.1 Examination. - Each of the sample sheets selected in accordance with 4.2.2 shall be surface examined, weighed, and measured to determine conformance with the requirements of this specification which do not require tests. Any sheet in the sample containing one or more visual or dimensional defects shall be rejected, and if the number of defective sheets in any sample exceeds the acceptance number for the sample, the lot represented by the sample shall be rejected.

4.3.2 Lot acceptance tests. - The samples selected in accordance with 4.2.3 shall be subjected to the tests specified in 4.4 to determine conformance with this specification except that the vibration test (see 4.4.3) and the thermal conductivity test (see 4.4.6) shall be conducted only when specified (see 6.1).

Table II—Sampling for visual, dimensional and weight per square foot examination
AQL (approx.) = 2.5 percent defective.

Number of fiberboard boxes of sheets in inspection lot	Number of boxes in sample for weight per square foot examination	Number of sheets in sample for visual and dimensional examination	Weight per square foot examination acceptance number (defectives)	Visual and dimensional examination acceptance number (defectives)
40 and under	5	10	0	0
41 to 110	10	15	0	1
111 to 300	15	25	1	1
301 to 500	25	35	1	2
501 and over	35	50	2	3

4.3.2.1 Action in case of failure. - If any of the samples tested is found to be not in conformance with this specification, the lot which it represents shall be rejected.

4.4 Test procedures. -

4.4.1 Thickness and density. - The thickness and density of the insulation shall be determined in accordance with the method specified in ASTM C167-50.

4.4.2 Fineness of fibers. - Diameters of fibers shall be determined microscopically on the basis of measuring 7 fibers on each of the 7 samples selected in accordance with 4.2.3. The average diameter for purposes of determining conformance with 3.4 shall be the average of all measurements on all samples.

4.4.3 Resistance to vibration. - The test for determining ability of the material to withstand vibration while subjected to a temperature of 750°F. shall be conducted on two 2-foot square, 2-inch thick, sheets which shall be mounted on the faces of an electrical heater plate. The ends of the heater plate shall be insulated with cut sections of the material and the entire assembly shall be fitted and mounted within a 1/16-inch thick sheet-iron casing 30 by 30 by 6 inches. The casing shall be mounted in a vertical position on a vibration test apparatus. Five iron constantan thermocouples, equally spaced and secured in each face of the heater plate and the outer surfaces of the metal casing, shall afford a means of ascertaining the inner and the exposed temperature of the assembly. During the test the material shall be subjected to 720 vibrations per minute through an arc of 15 minutes for a period of 100-hours of operation. At the end of the 100-hour period of operation the outer metal casing of the assembly shall be removed and the condition of the sheets noted.

4.4.4 Alkalinity. - Weigh a 5 gm. $\pm$0.01 gm. representative sample of the blanket, and introduce into a 500 mℓ. pyrex Erlenmeyer flask. Wet with 5 mℓ. of 95 percent ethyl alcohol, and add 400 mℓ. of distilled water. Reflux for 4 hours $\pm$5 minutes. At the end of this period, disconnect the condenser and filter at once through No. 41 Whatman paper supported in a Buechner funnel. Wash the flask and material three times with 25 mℓ. portions of hot distilled water using suction. Titrate immediately with 0.02 NH_2SO_4, using 6 to 8 drops of 1 percent solution of phenol-red indicator, to the disappearance of the pink color. Run a blank determination on the same amount of distilled water and alcohol and correct for any alkalinity shown. The percentage alkalinity as Na_2O is calculated from the following formula: percent Na_2O = 0.0124 (mℓ. H_2SO_4 used by sample minus mℓ. H_2SO_4 used by blank).

4.4.5 Fusing temperature. - Weigh 1 gm. of glass fiber into a crucible and place in a muffle furnace at room temperature. Turn all heating elements on at start of test and adjust so that the specified temperature of 1250°F. is reached in 45 minutes. When this temperature is reached, remove crucible from furnace immediately, allow to cool, and examine visually for fusion. Fusion shall be said to have taken place if any part of the sample has melted and formed a homogeneous mass.

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

4.4.7 Nonfibrous material (shot) content. - The nonfibrous material (shot) content shall be determined for each sample by separating by hand 10 grams of fiber as fine as possible over a U.S. Standard No. 30 sieve having a U.S. Standard No. 50 sieve and a pan underneath. Breaking up the material facilitates its separation so that the fiber can be picked up readily. The material remaining after the fiber is picked out shall be screened by hand and all the fiber remaining on the No. 30 and No. 50 sieves shall be picked off. The fine splinters and dust shall be aspirated and the remainder on the No. 30 and No. 50 sieves shall be combined and weighed as the nonfibrous material (shot) content.

4.5 Examination of preparation for delivery. - Sample felts and shipping containers shall be selected and examined in accordance with MIL-P-116 to verify conformance to the requirements of section 5 herein.

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, size, thickness, Federal stock number or manufacturer's part number, contract or order number, contractor's name and destination.

5.2 Domestic shipment and storage or overseas shipment. - The requirements and levels of packing

and marking for shipment shall be specified by the procuring activity (see 6.1).

(5.2.1 The following provides various levels of protection during domestic shipment and storage or overseas shipment, which may be required when procurement is made (see 6.1).

5.2.1.1 Packing. -

5.2.1.1.1 Level A. - Insulation felt shall be packed in a container conforming to PPP-P-636, class 2. All corners and edge seams, and manufacturer's joint shall be waterproofed in accordance with the appendix to PPP-B-636.

5.2.1.1.2 Level B. - Insulation felt shall be packed in fiberboard boxes conforming to class 1 of PPP-B-636.

5.2.2 Marking. - In addition to any special marking required, interior packages and exterior shipping containers shall be marked in accordance with MIL-STD-129.)

6. NOTES

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

(a) Title, number, and date of this specification.
(b) Width and thickness required (see 3.2.2 and 3.3).
(c) Resistance to vibration and thermal conductivity test. if required (see 4.4.3 and 4.4.6).
(d) Preservation packaging. packing or marking requirements other than those required by 5.1 (see 5.2).

6.2 The physical property requirements of this specification is similar to ASTM C382-56T.

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 5640-N020Sh)

SPECIFICATION ANALYSIS SH
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? ☐ YES ☐ NO IF THE ANSWER IS "YES", IN WHAT WAY?

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

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