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25 MAY 1960
SUPERSEDING
MIL-I-2818
23 AUGUST 1951

MILITARY SPECIFICATION

INSULATION BLANKET, THERMAL, FIBROUS MINERAL

This specification has been approved by the Department of Defense and is mandatory for use by the Departments of the Army, the Navy, and the Air Force.

1. SCOPE

1.1 This specification covers fibrous mineral insulation blanket for insulating hot surfaces of machinery and equipment.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

FEDERAL

PPP-B-585 — Boxes, Wood, Wirebound.

PPP-B-591 — Boxes; Fiberboard, Wood-Cleated.

PPP-B-601 — Boxes, Wood-Cleated, Plywood.

PPP-B-621 — Boxes, Wood, Nailed and Lock-Corner.

PPP-B-636 — Boxes, Fiber.

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MIL-B-10377 — Boxes, Wood-Cleated, Veneer, Paper Overlaid.

MIL-L-10547 — Liners, Case, Waterproof.

STANDARDS

MILITARY

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

MIL-STD-129 — Marking for Shipment and Storage.

(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.

OFFICIAL CLASSIFICATION COMMITTEE

Uniform Freight Classification Rules.

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

AMERICAN SOCIETY FOR TESTING MATERIALS

Standard C-167—Thickness and Density of Blanket-or-Butt Type Thermal Insulating Materials, Methods of Test for.

FSC 5640

Standard C–177—Thermal Conductivity of Materials by Means of the Guarded Hot Plate, Method of Test for.

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

3. REQUIREMENTS

3.1 Materials. The basic material shall be made of rock, slag, glass, or mixtures thereof, processed from a molten state into fibrous form, felted and secured between supporting members.

3.1.1 *Mineral fiber.*

3.1.1.1 *Nonfibrous material (shot).* The mineral fibers shall contain not more than 20 percent by weight of nonfibrous material (shot) (see 4.4.1).

3.1.1.2 *Alkalinity.* The alkalinity of the mineral fibers expressed as sodium oxide (Na_2O) shall not exceed 0.60 percent (see 4.4.2).

3.1.1.3 *Sulfur.* The mineral fibers shall contain not more than 0.50 percent of sulfur (see 4.4.3).

3.1.2 *Binder.* If a binder is required in the manufacturing of the blanket, it shall not exceed 1.5 percent of the weight of the fibrous mineral component of the blanket (see 4.4.4).

3.1.3 *Supporting members.* The supporting members shall be 1-inch wire mesh with wire approximately 0.036 inch in diameter or expanded metal lath.

3.2 Construction. The blanket shall be composed of a felted fibrous mineral component, with or without binder, secured between supporting members which are attached to each other by tie wires spaced approximately 7 inches apart passing vertically through the blanket. The blanket shall have wire mesh on both sides or wire mesh on one side and expanded metal lath on the other side, as specified (see 6.1).

3.3 Dimensions. The length, width and thickness of the blanket shall be as specified (see 6.1). A minus tolerance of ⅛ inch and an excess in all dimensions will be permitted (see 4.4.5).

3.4 Density. The blanket, without supporting members, shall weigh not more than 12 pounds per cubic foot (see 4.4.5).

3.5 Thermal conductivity. The thermal conductivity (K) of the insulation blanket, without supporting members, shall not exceed 0.55 B.t.u. per square foot per hour per degree Fahrenheit (°F) for thickness of 1 inch at a mean temperature of 450°F. (see 4.4.6).

3.6 Moisture absorption. The insulation blanket, without supporting members, shall not absorb more than 1.25 percent by weight of water (see 4.4.7).

3.7 Resistance to vibration. The insulation blanket shall not sag, settle or shake down when tested as specified in 4.4.8.

3.8 Workmanship. The workmanship shall be first class in every respect.

4. QUALITY ASSURANCE PROVISIONS

4.1 The supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own or any other inspection facilities and services acceptable to the Government. Inspection records of the examination and tests shall be kept complete and available to the Government as specified in the contract or order. 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 *Lot.* For purposes of sampling, a lot shall consist of all insulation blankets of the same thickness produced under essentially the same conditions and offered for delivery at one time.

4.2.2 *Sampling for visual and dimensional examination.* A random sample of blankets shall be selected from each lot offered for Government examination in accordance with Standard MIL–STD–105 at Inspection Level II. The Acceptance Quality Level shall be 2.5 percent defective.

4.2.3 *Sampling for lot acceptance tests.* From each lot, three sample blankets shall be selected at random for the tests specified in 4.3.2.

4.3 Inspection.

4.3.1 *Visual and dimensional examination.* The samples selected in accordance with 4.2.2 shall be visually and dimensionally examined to verify compliance with this specification. Any blanket in the sample containing one or more visual or dimensional defects shall be rejected, and if the number of defective blankets in any sample exceeds the acceptance number for that 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 4.4.1 to 4.4.5, inclusive. When specified in the contract or order (see 6.1), the performance tests of 4.4.6, 4.4.7, and 4.4.8 shall also be conducted. If any sample 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 *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 sieve 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.

4.4.2 *Alkalinity.* The alkalinity test shall be performed as follows: Weigh a 5-gram (± 0.01 gram) representative sample[1] of the mineral fiber, and introduce into a 500-milliliter (ml.) pyrex Erlenmeyer flask. Wet with 5 ml. of 95 percent ethyl alcohol, and add 400 ml. of distilled water. Reflux for 4 hours ± 5 minutes. At the end of this period, disconnect the condenser and filter at once through No. 41 Whatman paper supported in a Buechners funnel. Wash the flask and material three times with 25-ml. portions of hot distilled water using suction. Titrate immediately with 0.02N H_2SO_4, using six to eight 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 shall be calculated from the following formula: percent $Na_2O = 0.0124$ (mls. H_2SO_4 used by sample minus mls. H_2SO_4 used by blank).

4.4.3 *Sulfur content.* The sulfur content of the mineral fiber shall be determined by chemical analysis, using accepted laboratory methods.

4.4.4 *Binder content.* The binder content of each sample tested shall be determined by heating not less than ½ square foot of mineral fiber material to approximately 800°F. for 3 hours in an oven adequately vented in such a manner as to insure complete circulation of the atmosphere of the entire oven chamber, preferably by fan or other forced circulation methods. The weight before and after heating shall be taken under atmospheric conditions of the same relative humidity.

4.4.5 *Thickness and density.* The thickness and density of the insulation shall be determined in accordance with the method specified in ASTM Standard C–167.

[1] A representative sample is conveniently prepared by taking borings with a large cork borer through the cross section of the insulation.

4.4.6 *Thermal conductivity.* Thermal conductivity shall be determined in accordance with the method specified in ASTM Standard C–177.

4.4.7 *Moisture absorption.* Specimens of the mineral fiber component, 3½ by 3½ by 3 inches, shall be weighed. Then the specimens shall be subjected to an atmosphere of 90 ± 3 percent relative humidity at 120° ± 3°F. for 6 hours. The specimens shall be weighed immediately upon removal from the test chamber and the percent moisture absorption shall be determined.

4.4.8 *Resistance to vibration.* Two 2 foot by 2 foot by 2 inch specimens of the blanket shall be mounted on the faces of an electrical heater plate. The ends of the heater plate shall be insulated 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. The heater plate shall be maintained at a temperature of 750°F. during the test. The specimens 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 specimens noted.

4.5 Inspection of preparation for delivery. The preservation, packaging, packing, and marking of the equipment shall be subject to inspection to determine compliance with the requirements of section 5 of this specification.

5. PREPARATION FOR DELIVERY

5.1 Packing.

5.1.1 *Level A.* Insulation blankets shall be packed in overseas type wood cleated fiberboard, nailed wood, wirebound wood, corrugated or solid fiberboard, wood cleated paper overlaid, or wood cleated plywood boxes conforming to Specifications PPP–B–591, PPP–B–621, PPP–B–585 class 3, PPP–B–636 class 3, MIL–B–10377, and PPP–B–601, respectively. Shipping containers shall have case liners conforming to Specification MIL–L–10547 and shall be closed and sealed in accordance with appendix thereto. Case liners may be omitted for boxes conforming to Specification PPP–B–636 provided all corners and edge seams and manufacturer joints of the boxes are sealed with minimum 1½ inch wide tape as specified in the appendix of the box specification. Box closures shall be as specified in the applicable box specification or appendix thereto. The gross weight of wood boxes shall not exceed 200 pounds; fiberboard boxes shall not exceed the weight limitation of the applicable box specification.

5.1.2 *Level B.* Insulation blankets shall be packed in domestic type wood cleated fiberboard, nailed wood, wirebound wood, corrugated or solid fiberboard, wood cleated plywood, or wood cleated paper overlaid boxes conforming to Specifications PPP–B–591, PPP–B–621, PPP–B–585 class 1 or 2, PPP–B–636 class 2, PPP–B–601, and MIL–B–10377, respectively. Closures shall be as specified in the applicable box specification, or appendix thereto. Fiberboard boxes shall not exceed the weight limitation of the applicable box specification. The gross weight of wood boxes shall not exceed 200 pounds.

5.1.3 *Level C.* Insulation blankets shall be packed in containers in a manner to insure safe delivery and acceptance at destination. Containers shall comply with the Uniform Freight Classification Rules or other carrier regulations applicable to the mode of transportation.

5.2 Marking. In addition to any special marking required (see 6.1), shipments shall be marked in accordance with Standard MIL–STD–129.

6. NOTES

6.1 Ordering data. Procurement documents should specify the following:

(a) Title, number, and date of this specification.

(b) Whether wire mesh on both sides or wire mesh on one side and expanded metal lath on the other side is required (see 3.2).

(c) Length, width and thickness required (see 3.3).

(d) Whether thermal conductivity, moisture absorption, and resistance to vibration tests are required (see 4.3.2).

(e) Level of packing required (see 5.1).

(f) Special marking required (see 5.2).

Custodians:

Army—Corps of Engineers
Navy—Bureau of Ships
Air Force

Preparing activity:

Navy—Bureau of Ships
(Project 707–115)

(102)

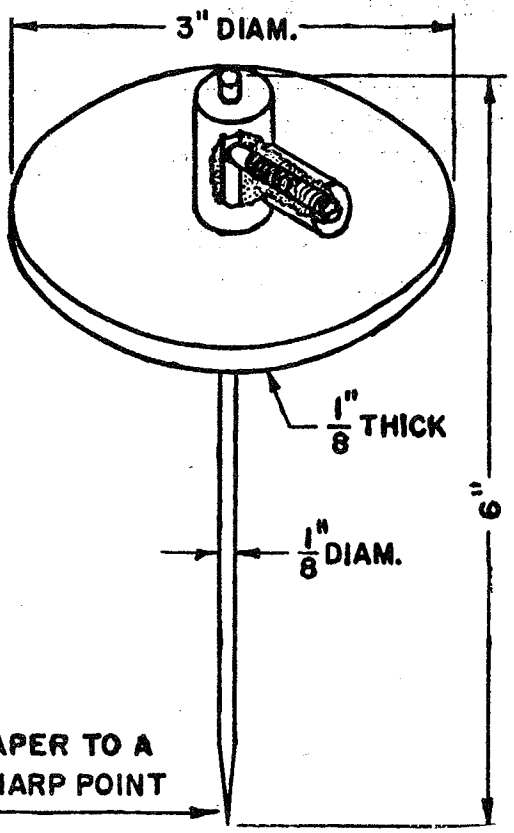

Figure 1.-Depth gage for thickness measurements.

E01

SPECIFICATION ANALYSIS SHEET

Form Approved
Budget Bureau No. 119-R004

INSTRUCTIONS

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 Department of Defense. 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 lines on reverse side, staple in corner, and send to preparing activity *(as indicated on reverse hereof)*.

SPECIFICATION

ORGANIZATION *(Of submitter)*

CITY AND STATE

CONTRACT NO.

QUANTITY OF ITEMS PROCURED

DOLLAR AMOUNT
$

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ 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 "YES", IN WHAT WAY?

4. REMARKS *(Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)*

SUBMITTED BY *(Printed or typed name and activity)*

DATE

DD FORM 1 APR 63 1426 REPLACES NAVSHIPS FORM 4863, WHICH IS OBSOLETE

PLATE NO. 15419

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FOLD

DEPARTMENT OF THE NAVY

POSTAGE AND FEES PAID
NAVY DEPARTMENT

OFFICIAL BUSINESS

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PLATE NO. 15419 (BACK)