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 SUPERSEDING  
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MILITARY SPECIFICATION  
 INSULATION BLOCK, THERMAL

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 Scope. - This specification covers thermal insulation block for insulating machinery and equipment.

1.2 Classification. - Block shall be of the following classes, as specified (see 6.1):

- Class 1 - Temperatures up to 500° Fahrenheit (F.).
- Class 2 - Temperatures up to 1,000° F.
- Class 3 - Temperatures up to 1,500° F.
- Class 4 - Temperatures up to 2,000° F.

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:

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, Fiberboard.

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- MIL-P-116 - Preservation, Methods of.
- MIL-B-10377 - Boxes; Wood-Cleated, Veneer, Paper Overlaid.
- MIL-L-10547 - Liners, Case, Waterproof.

STANDARDS

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- 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 Avenue at 33rd Street, New York 16, N. Y.)

AMERICAN SOCIETY FOR TESTING MATERIALS  
 STANDARDS

- C165-54 - Compressive Strength of Preformed Block-Type Thermal Insulating, Standard Method of Test for.
- C177-45 - Thermal Conductivity of Materials by Means of the Guarded Hot Plate, Standard Method of Test for.
- C203-58 - Breaking Strength and Calculated Flexural Strength of Preformed Block-Type Insulation, Standard Method of Test for.
- C303-56 - Density of Preformed Block-Type Thermal Insulation, Standard Method of Test for.
- C421-58T - Mechanical Stability of Preformed Thermal Insulation by Tumbling, Method of Test for.

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

3. REQUIREMENTS

3.1 Qualification. - The insulation block furnished under this specification shall be a product which has

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been tested, and passed the qualification tests specified herein, and has been listed on or approved for listing on the applicable qualified products list.

3.2 Material. - The insulation block shall be composed of heat-resisting compounds suitable for the temperature conditions and the purpose intended.

3.3 Composition. - The insulation block shall conform in all respects to the composition obtained on the sample submitted for qualification (see 4.5.2).

3.4 Dimensions and tolerances. -

3.4.1 Dimensions. - Insulation shall be furnished in block form in 18- or 36-inch lengths, and in 3, 6 or 9-inch widths. Blocks shall be furnished in thicknesses of 3/4, 1, 1-1/8, 1-1/4, 1-1/2, 2, 2-1/2, or 3 inches (see 6.1).

3.4.2 Tolerances. - A tolerance of plus or minus 1/8 inch in length, plus or minus 1/16 inch in width and thicknesses will be permitted.

3.5 Resistance to vibration. - The insulation block shall be in satisfactory condition upon completion of the test specified in 4.5.3.

3.6 Physical requirements. - The insulation block shall conform to the physical requirements shown in table I.

3.7 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 Qualification tests at a laboratory <sup>1/</sup> - Qualification tests shall be conducted at a laboratory satisfactory to the Bureau of Ships. These tests shall consist of the tests specified in 4.5.

4.3 Sampling. -

4.3.1 Lot. - For purposes of sampling, a lot shall consist of all insulation block of the same class thickness, width, and length produced under essentially the same conditions and offered for delivery at one time.

<sup>1/</sup> Application for Qualification tests shall be made in accordance with "Provisions Governing Qualification" (see 6.2 and 6.3).

Table I - Physical requirements.

	Class 1	Class 2	Class 3	Class 4
Density, pounds per cubic foot, maximum	15.0	15.0	26.0	26.0
Compressive strength, at not more than 10 percent deformation min. p. s. i.	50.0	50.0	50.0	50.0
Mechanical stability, loss in weight, percent, maximum				
After first 10 minutes	50.0	50.0	55.0	55.0
After second 10 minutes	80.0	80.0	80.0	80.0
Modulus of rupture, pounds per square inch, minimum	<sup>1/</sup>	<sup>1/</sup>	<sup>2/</sup>	<sup>2/</sup>
Change under soaking heat, 6 hours at °F.	500	1,000	1,500	2,000
Loss in weight, percent, maximum	18.00	12.00	10.00	10.00
Linear shrinkage, percent, maximum	2.00	2.00	2.00	3.00
Moisture absorption, percent by volume, maximum	2.00	3.00	3.00	3.00
Thermal conductivity, B. t. u. /hr. /sq. ft. /°F. /inch, maximum, at a mean temperature of				
300° F.	0.56	---	---	---
550° F.	---	0.66	---	---
800° F.	---	---	0.78	0.78

<sup>1/</sup> Three times density (pounds per cubic foot) of the sample tested.

<sup>2/</sup> Two and one-half times density (pounds per cubic foot) of sample tested.

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**4.3.2 Sampling for visual, dimensional and density examination.** - A random sample of insulation block shall be selected from each lot offered for inspection in accordance with Standard MIL-STD-105 at inspection level II. The Acceptance Quality Level shall be 2.5 percent defective.

**4.3.3 Sampling for acceptance inspection.** - A random sample of blocks shall be selected from each inspection lot in accordance with Standard MIL-STD-105 at inspection level L-4 for the tests specified in 4.4.2.

#### **4.4 Examination and tests.** -

**4.4.1 Visual, dimensional and density examination.** - Each of the sample blocks selected in accordance with 4.3.2 shall be visually and dimensionally examined and the density determined to verify compliance with this specification. Any block in the sample containing one or more visual, dimensional, or density defects shall be rejected, and if the number of defective blocks in any sample exceeds the acceptance number for that sample, the lot represented by the sample shall be rejected.

**4.4.2 Acceptance inspection.** - Each of the sample blocks selected in accordance with 4.3.3 shall be subjected to the tests specified in 4.5.5, 4.5.6, 4.5.7 and 4.5.8 and to any additional tests deemed necessary by the laboratory to determine that the samples conform with that given qualification. If any sample block fails one or more of these tests, the lot shall be rejected.

#### **4.5 Test procedures.** -

**4.5.1 Conditioning samples.** - Test specimens shall be conditioned by drying to constant weight in an oven at a temperature of 215 to 250°F. preceding a test.

**4.5.2 Composition.** - The composition shall be determined by chemical analysis using accepted laboratory methods.

**4.5.3 Resistance to vibration.** - Two blocks 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 with a 1/16 inch thick sheet-iron casing. The casing shall be mounted in a vertical position on a vibration test apparatus. The heater plate shall be maintained at the maximum temperature for the respective class during the test. The assembly shall be subjected to 720 vibrations per minute through an arc of 15 minutes for a period of 100 to 400 hours of operation. At the end of each 100-hour period of operation, the outer metal casing of the assembly shall be removed and the condition of the blocks noted.

**4.5.4 Density.** - The density shall be determined in accordance with the method specified in ASTM Standard C303-56.

**4.5.5 Compressive strength.** - The compressive strength shall be determined in accordance with the method specified in ASTM Standard C165-54.

**4.5.6 Mechanical stability.** - Mechanical stability shall be determined in accordance with the method specified in ASTM Standard C421-58T.

**4.5.7 Flexural strength.** - The flexural strength shall be determined in accordance with ASTM Standard C203-58.

**4.5.8 Physical changes under soaking heat.** - Specimens shall be weighed and measured. Then the specimens shall be placed in an electrically heated oven and subjected to the maximum temperature for the respective class for 6 hours. The specimens shall be removed from the oven and tested to determine loss of weight and linear shrinkage (see table I.)

**4.5.9 Moisture absorption.** - Specimens shall be subjected to an atmosphere of 90 percent relative humidity at 120°F. dry-bulb temperature for 6 hours. The increase in weight shall be noted and recorded as percentage increase in weight by volume.

**4.5.10 Thermal conductivity.** - Conductivity shall be determined in accordance with the method specified in ASTM Standard C177-45.

**4.6 Inspection of preparation for delivery.** - Sample packs shall be selected and inspected in accordance with Specification MIL-P-116 to verify conformance to the requirements of Section 5 of this specification. Examination of packing and marking not covered by referenced specifications shall be in accordance with inspection level I of Standard MIL-STD-105, using an AQL of 2.5 percent defective.

### **5. PREPARATION FOR DELIVERY**

**5.1 Packing.** - Packing shall be level A, B, or C as specified (see 6.1).

**5.1.1 Level A.** - Blocks of one class and size shall be packed in wood cleated fiberboard, nailed wood, fiber, wirebound wood, wood cleated veneer paper overlaid, or wood cleated plywood boxes conforming to Specification PPP-B-591 (overseas type), PPP-B-621 (class 2), PPP-B-636 (class 2), PPP-B-585 (class 3), MIL-B-10377 (overseas type) and PPP-B-601 (overseas type) respectively at the option of the contractor. Shipping containers shall have case liners conforming to Specification MIL-L-10547. Case liners shall be closed and sealed in accordance with the appendix to Specification

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MIL-L-10547. Case liners for boxes conforming to Specification PPP-B-636 may be omitted provided all center and edge seams and manufacturer's joint are waterproof in accordance with the appendix to Specification PPP-B-636. Boxes shall be closed, banded or strapped in accordance with the applicable box specification or appendix thereto. The gross weight of wood or wood-cleated boxes shall not exceed 200 pounds; fiber boxes shall not exceed the weight limitations of the applicable box specification.

5.1.2 Level B. - Blocks of one class and size shall be packed in wood cleated fiberboard, nailed wood, wirebound wood, wood cleated plywood, wood cleated veneer paper overlaid or fiber boxes conforming to Specification PPP-B-591 (domestic type), PPP-B-621 (class 1), PPP-B-585 (class 1), PPP-B-601 (domestic type), MIL-B-10377 (domestic type), and PPP-B-636 (class 1), respectively, at the option of the contractor. Box closure shall be as specified in the applicable box specification or appendix thereto. The gross weight of wood or wood cleated boxes shall not exceed 200 pounds.

5.1.3 Level C. - Blocks shall be packed in containers in a manner which will insure acceptance by common carrier and safe delivery to destination. Shipping containers shall comply to the Uniform Freight Classification Rules or other regulations as applicable to the mode of transportation at the lowest cost.

5.2 Marking. - In addition to any special marking specified in the contract or order, shipping containers 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.

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 Air Force - MOA

- (b) Class required (see 1.2).
- (c) Thickness, width and length required (see 3.4).
- (d) Level of packing required (see 5.1).

6.2 With respect to products requiring qualification, awards will be made only for such products as have, prior to the time set for opening of bids, been tested and approved for inclusion in Qualified products List QPL-2819, whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification, in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the qualified products list is the Chief of the Bureau of Ships, Department of the Navy, Washington 25, D.C., and information pertaining to qualification of products may be obtained from that activity. Application for Qualification tests shall be made in accordance with "Provisions Governing Qualification" (see 6.3).

6.3 Copies of "Provisions Governing Qualification" may be obtained upon application to Commanding Officer, Naval Supply Depot, 5801 Tabor Avenue, Philadelphia 20, Pennsylvania.

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:  
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