

MIL-B-16305B

8 APRIL 1964

SUPERSEDING**MIL-B-16305A**

19 MAY 1952

MILITARY SPECIFICATION**BRICK, REFRACTORY, INSULATING**

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 refractory insulating brick for industrial furnace requirements and in general where they may be in direct contact with combustion gases, such as forge and stress relieving furnaces.

1.2 Classification. Refractory insulating brick shall be of the following classes, as specified (see 6.1) :

Class A — 2,000°F.

Class B — 2,800°F.

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 this specification to the extent specified herein :

SPECIFICATIONS**FEDERAL**

- | | |
|-----------|--|
| QQ-S-781 | — Steel Strapping, Flat. |
| PPP-B-601 | — Boxes, Wood, Cleated-Plywood. |
| PPP-B-621 | — Boxes, Wood, Nailed and Lock-Corner. |
| PP-B-636 | — Box, Fiberboard. |

MILITARY

MIL-L-10547 — Liners, Case, and Sheet, Overwrap; Water - Vapor-proof or Water-proof, Flexible.

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 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 document forms 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.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

FSC 9350

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C24 — Pyrometric Cone Equivalent (PCE) of Refractory Materials, Standard Method of Test for.

C93 — Crushing Strength and Modulus of Rupture of Insulating Fire Brick at Room Temperature.

C210 — Reheat Change of Insulating Fire Brick, Standard Method of Test for

C437 — Size and Bulk Density of Insulating Fire Brick, Standard Method of Test for.

(Application for copies should be addressed to the American Society for Testing And 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.)

(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 Qualification. The refractory insulating brick furnished under this specification shall be a product which has 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. Bricks shall be composed of heat-resistant materials which have been burned or fired to produce the desired strength, low heat conductivity and structure.

3.3 Dimensions. Unless otherwise specified in the contract or order, the size of the brick shall be either 9 by $4\frac{1}{2}$ by $2\frac{1}{2}$ inches or 9 by $4\frac{1}{2}$ by $1\frac{1}{4}$ inches (see 6.1).

3.4 Dimension tolerances.

3.4.1 Standard 9 by $4\frac{1}{2}$ by $2\frac{1}{2}$ inch straight brick shall not vary from the specified dimensions by more than one-sixteenth inch in width or thickness and three-thirty-seconds inch in length. (See 4.5.1)

3.4.2 The 9 by $4\frac{1}{2}$ by $1\frac{1}{4}$ inch split brick shall not vary from the specified dimension by more than that permitted for the standard size brick, except that the thickness shall not vary more than one-thirty-second inch. (See 4.5.1)

3.4.3 For special shapes, no dimensions shall vary more than 2 percent from the dimensions specified, except that the maximum variation permitted will be one-sixteenth inch.

3.5 Marking. Bricks shall be marked with the manufacturer's name or trade-mark of such known character that the source of manufacture may be readily determined and service classification of the brick shall be indented into or stamped on each brick.

3.6 Class A.

3.6.1 Density. The average weight shall be not more than 2.3 pounds for the 9 by $4\frac{1}{2}$ by $2\frac{1}{2}$ inch straight brick, and not more than 1.15 pounds for the 9 by $4\frac{1}{2}$ by $1\frac{1}{4}$ inch split brick. The bulk density shall average approximately 40 to 41 pounds per cubic foot, when tested as specified in 4.5.1.

3.6.2 Pyrometric cone equivalent. The pyrometric cone equivalent shall average not less than cone 16 (2716°F.) (see 4.5.2).

3.6.3 Modulus of rupture. The modulus of rupture shall average not less than 75 pounds per square inch (p.s.i.), and not more than two of the 10 bricks tested shall show less than 60 p.s.i., when tested as specified in 4.5.3.

3.6.4 Reheat change. Bricks shall show an average of not more than 2 percent when tested as specified in 4.5.4.1.

3.7 Class B.

3.7.1 Density. The average weight shall be not more than 3.50 for the 9 by 4½ by 2½ inch straight brick, and not more than 1.80 pounds for the 9 by 4½ by 1¼ inch split brick. The bulk density shall average approximately 60 to 62 pounds per cubic foot, when tested as specified in 4.5.1.

3.7.2 Pyrometric cone equivalent. The pyrometric cone equivalent shall be not less than cone 34 (3205°F.) (see 4.5.2).

3.7.3 Modulus of rupture. The modulus of rupture shall average not less than 175 p.s.i. and not more than two of the 10 bricks tested shall show less than 150 p.s.i. when tested as specified in 4.5.3.

3.7.4 Reheat change. Bricks shall show an average of not more than 2 percent when tested as specified in 4.5.4.2.

3.8 Workmanship. Bricks shall be of homogenous structure, free from cracks, laminations, segregations, void defects, or soft centers. All corners and edges shall be sufficiently strong to prevent excessive crumbling or chipping when handled or

shipped.

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, the supplier may utilize his own facilities or any commercial laboratory satisfactory to 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 Qualification tests. Qualification tests shall be conducted at a laboratory satisfactory to the Bureau of Ships. Qualification tests shall consist of the tests specified in 4.4.1 and 4.4.2. Application for Qualification tests shall be made in accordance with "Provisions Governing Qualification" (see 6.2 and 6.3).

4.2.1 Qualification testing. Qualification testing of brick shall be conducted in accordance with table 1 and the applicable tests of 4.5. Number of sample bricks for qualification testing shall be as specified in table I. Failure to meet the requirements specified shall be cause for rejection.

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TABLE I. Instructions for testing

Characteristic	Specification reference		Rqmts. appl. to		Number Determinations per unit	Results reported as		Sample size	Acceptance number
	Requirement	Test method	Indiv. unit	Lot average		Pass or fail ¹	Numerically to nearest ²		
Density:									
Class A	3.6.1	4.5.1	.....	X	1	.....	Lb/cu. ft.	10	.....
Class B	3.7.1	4.5.1	.....	X	1	.....	Lb/cu. ft.	10	.....
Pyrometric cone equivalent:									
Class A	3.6.2	4.5.2	.....	.....	2 (Composite)	X	Cone No.	.....	.....
Class B	3.7.2	4.5.2	.....	.....	2 (Composite)	X	Cone No.	.....	.....
Modulus of rupture:									
Class A	3.6.3	4.5.3	.....	X	1	.....	P.S.I.	10	.....
Average unit.			X	.....	1	.....	P.S.I.	10	2
Class B	3.7.3	4.5.3	.....	X	1	.....	P.S.I.	10	.....
Average unit.			X	.....	1	.....	P.S.I.	10	2
Reheat change:									
Class A	3.6.4	4.5.4.1	.....	X	1	.....	0.1 percent	3	.....
Class B	3.7.4	4.5.4.2	.....	X	1	.....	.1 percent	3	.....

¹ If failure is indicated report either description of failure or numerical point of failure, as applicable.
² Test reports shall include all values on which average results are based.

4.3 Sampling for quality conformance inspection. Sampling for quality conformance inspection shall be performed in accordance with the provisions set forth in MIL-STD-105, except where otherwise indicated. For purposes of sampling, an inspection lot for examinations and tests shall consist of all bricks of the same class, size and shape offered for delivery at one time.

4.3.1 Inspection levels and acceptable quality levels (AQLs) for examination. The inspection levels for determining the sample size, and the acceptable quality levels (AQLs) expressed in defects per 100 units, shall be as follows:

Examination paragraph	Inspection level	AQL
4.4.1.1	I	2.5
4.4.1.2	S-3	2.5
4.4.2	S-2	4.0

4.4 Quality conformance inspection.

4.4.1 Examination. Examination of the bricks shall be made in accordance with the classification of defects, inspection levels and acceptable quality levels (AQLs) set forth herein. The lot size, for purpose of determining the sample size in accordance with MIL-STD-105, shall be expressed in units of bricks for examination in 4.4.1.1, 4.4.1.2, and in units of shipping containers for examination in 4.4.2.

4.4.1.1 Examination of the bricks for defects in appearance and workmanship. The sample unit for this examination shall be one brick.

Examine	Defect
Appearance and workmanship.	Material not as specified. Not properly burned or fired as required. Not free from cracks, laminations, segregations, and void surface defects. Corners or edges chipped or crumbled affecting serviceability. Shape of brick not as required.

4.4.1.2 Examination of the bricks for defects in dimensions. The sample unit for this examination shall be one brick.

Examine	Defect
Standard straight brick	Width or thickness varies by more than $\pm \frac{1}{16}$ inch from size specified. Length varies by more than $\pm \frac{3}{32}$ inch from size specified.
Split brick	Width varies by more than $\pm \frac{1}{16}$ inch from size specified. Length varies by more than $\pm \frac{3}{32}$ inch from size specified. Thickness varies by more than $\pm \frac{1}{32}$ inch from size specified.
Special shape brick	Length, width, and thickness varies by more than ± 2 percent from any dimension specified. Any dimension varies by more than $\pm \frac{1}{16}$ inch from that specified.

4.4.2 Examination of preparation for delivery. An examination shall be made to determine that the packing and markings comply with the requirements of section 5 of this specification. The sample unit for this

examination shall be one shipping container, fully packed, selected just prior to the closing operation. Shipping containers fully prepared for delivery shall be examined for closure defects.

Examine	Defect
Packing	Not in accordance with contract requirements. Container not as specified, closures not accomplished by specified or required methods or materials. Any nonconforming component, component missing, damaged or otherwise defective, affecting serviceability. Inadequate application of components, such as incomplete closures of case liners, container flaps, loose or inadequate strappings, bulged or distorted containers.
Count	Number of bricks per container less than specified or indicated quantity.
Weight	Gross or net weight exceeds specified requirements.
Markings	Omitted, illegible, incorrect, incomplete, or not in accordance with contract requirements. (see 5.2).

4.5 Test procedures.

4.5.1 Size and bulk density. The size and bulk density shall be determined in accordance with the method specified in ASTM C-437.

4.5.2 Pyrometric cone equivalent. The pyrometric cone equivalent (PCE) shall be determined in accordance with the method specified in ASTM C-24.

4.5.3 Modulus of rupture. The modulus of

rupture shall be determined in accordance with the method specified in ASTM C-93.

4.5.4 Reheat change.

4.5.4.1 Class A. The reheat change for class A brick shall be determined in accordance with the method specified for group 20 in ASTM C-210.

4.5.4.2 Class B. The reheat change for class B brick shall be determined in accordance with the method specified for group 28 in ASTM C-210.

MIL-B-16305B**5. PREPARATION FOR DELIVERY****5.1 Packing.**

5.1.1 Level A. Bricks in quantities specified in 5.1.2 shall be packed in cleated plywood, nailed wood or fiberboard boxes conforming to PPP-B-601 (overseas type), PPP-B-621 or PPP-B-636 (class 2), respectively. Void spaces within the container shall be filled with cushioning material to prohibit movement within. Plywood and nailed wood boxes shall be lined with sealed case liners conforming to MIL-L-10547. The boxes shall be strapped as specified in the appendix of the applicable box specification.

5.1.2 Level B. Not more than 25 straight 9 by 4½ by 2½ inch brick or equivalent number of split bricks or special shapes shall be packed in suitable style corrugated or solid fiberboard boxes conforming to the special requirements of PPP-B-636. Boxes having a minimum mullen test of 200 pounds conforming to PPP-B-636 may be used where the gross weight per carton does not exceed 88 pounds. The boxes shall be strapped with one girthwise and one lengthwise tension tied steel band of a minimum ⅜ by 0.015-inch flat steel strapping conforming to QQ-S-781 or a minimum 16-gage, class A (15-gage, class B) galvanized round steel strapping conforming to QQ-S-790. Void spaces within the containers shall be filled with cushioning material to prohibit movement within.

5.1.3 Level C. The bricks shall be packed in a manner to insure carrier acceptance and safe delivery to destination at the lowest applicable rate. 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 the following

and any special marking required by the contract or order, shipping containers shall be marked in accordance with MIL-STD-129:

KEEP IN DRY PLACE

6. NOTES

6.1 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Class and dimensions required (see 1.2 and 3.3).
- (c) Whether packing is for level A, level B, or level C (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-16305 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, D.C. 20360, 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, Pa.

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Custodians:

Navy—Ships

Air Force—MOA

Preparing activity:

Navy—Ships

Project No. 9350-0030

Reviewer:

Navy—Ships, Docks

Air Force—69

Note. Review/user information is current as of the date of this document. For future coordination of changes to this document, draft circulation should be based on the information in the current DODISS.

SPECIFICATION ANALYSIS SHEET			Form Approved Budget Bureau No. 119-R004
INSTRUCTIONS			
<p>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.</p>			
SPECIFICATION			
ORGANIZATION		CITY AND STATE	
CONTRACT NO.	QUANTITY OF ITEMS PROCURED	DOLLAR AMOUNT	
		\$	
MATERIAL PROCURED UNDER A			
<input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> 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? <input type="checkbox"/> YES <input type="checkbox"/> 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

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