

PLAINTIFF'S
EXHIBIT
K-1637

9-29-09
9-33-21
MIL-C-2861C
17 September 1963
SUPERSEDED
MIL-C-002861C(SHIPS)
28 March 1963
MIL-C-2861A
5 July 1963

MILITARY SPECIFICATION
CEMENT, INSULATION, HIGH TEMPERATURE

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 high temperature insulation cement for use as thermal control on irregular surfaces of equipment and piping operating at temperatures between 100 and 1800° 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 the specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

UU-S-48 - Sacks, Paper, Shipping.

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 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.

AMERICAN SOCIETY FOR TESTING AND MATERIALS

C 186 - Covering Capacity and Volume Change Upon Drying for Thermal Insulating Cement, Test for.

C 177 - Thermal Conductivity of Materials by Means of the Guarded Hot Plate.

C 353 - Adhesion of Dried Thermal Insulating Cement.

C 354 - Compressive Strength of Thermal Insulating Cement.

C 356 - Linear Shrinkage of Preformed High-Temperature Thermal Insulation Subjected to Soaking Heat.

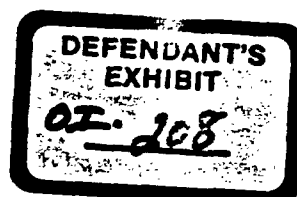
C 421 - Mechanical Stability of Preformed Thermal Insulation by Tumbling.

(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.)

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

3. REQUIREMENTS

3.1 Material - The insulation cement shall be composed of a dry mixture of refractory material, rock or mineral wool, asbestos fibers, and clay binder, thoroughly mixed to obtain uniform distribution of the ingredients. The composition of the cement shall be such that when properly mixed with fresh water it can be applied with a trowel or by hand.

3.2 Sulfur content - The sulfur content shall not exceed 0.50 percent (see 4.3.3).

3.3 Physical requirements - The cement shall conform to the physical requirements shown in Table 1.

Table 1 - Physical requirements.

Coverage (wt), board feet per 100 pounds of dry material, minimum	50
Shrinkage, volumetric, wet to dry, percent, maximum	2
Density, after being molded and dried, pounds per cubic foot, maximum	30
Compressive strength, at not more than 5 percent maximum loss	10
Mechanical stability, loss in weight, percent, maximum	
After first 10 minutes	4
After second 10 minutes	1
Dry adhesion to steel, minimum, p.s.i.	100
Linear shrinkage, percent, maximum	
After 6 hours at 750 F.	1
After 6 hours at 1200 F.	2
After 6 hours at 1500 F.	3
Thermal conductivity, maximum, Btu in. per sq. ft. degree Fahrenheit at mean temperature of	
200	0.02
500	0.02
750	0.02
Corrosion of steel	None

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection - Unless otherwise specified, the responsibility for inspection of the supplier is responsible for the performance of all inspection requirements as prescribed here. Except as otherwise specified, the supplier may utilize his own facilities or those of a third party for inspection as accepted by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to assure supplies and services conform to the prescribed requirements.

4.2 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 hereinafter. For purposes of sampling, an inspection lot for inspection and tests shall consist of all material offered for delivery at one time.

4.2.1 Examination of filled containers - A random sample of filled containers shall be taken from each lot in accordance with MIL-STD-105 at inspection level I and acceptable quality level - 4.0 percent defective to verify compliance with requirements regarding fill, closure, marking, and all other requirements not involving tests. Containers shall be examined for defects of construction of the container and the closure, for evidence of leakage, and for unsatisfactory markings; each sample filled container shall also be weighed to determine the amount of contents. Any container in the sample, having one or more defects, or under required fill, shall not be offered for delivery. If the number of defective containers in any sample exceeds the acceptance number for the appropriate sampling plan of MIL-STD-105, this shall be cause for rejection of the lot represented by the sample.

4.2.2 Testing - From each inspection lot, sample containers shall be selected at random, as follows, for the tests specified in 4.3:

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Lot size
15 or less
16 to 300
301 to 800
801 and over

Sample size
0 (no testing)
2
3
4

There shall be no evidence of failure to meet the specified requirements.

4.2.2.1 Thermal conductivity - The test of 4.3 need only be conducted for one of the following reasons:

- (a) If within five years preceding the date of invitation for bid the cement has not been tested by an acceptable testing laboratory and found in compliance with the requirements of 3.3.
- (b) If the cement offered for delivery is not the same in all respects as that previously tested.

4.3 Test procedures -

4.3.1 Sulfur content - The sulfur content shall be determined by either the combustion or evolution method.

4.3.2 Waterproofing indicator - A weighed quantity of cement shall be mixed with a specified quantity of water to determine the water-cement ratio. It shall be of the working consistency. The water-cement ratio shall be as recommended by the manufacturer.

4.3.3 Concrete pipe - The concrete pipe shall be tested in accordance with method ASTM-C 109.

4.3.4 Density - Moist specimens shall be air dried for 24 hours and then dried at 300°F in an electric oven to constant weight and the density computed on the oven-dried volume.

4.3.5 Compressive strength - Compressive strength shall be determined in accordance with method ASTM-C 354-56.

4.3.6 Mechanical stability - Mechanical stability shall be determined in accordance with method ASTM C 421-58T.

4.3.7 Dry adhesion to steel - Dry adhesion to steel shall be determined in accordance with method ASTM C 353-56.

4.3.8 Linear shrinkage shall be determined in accordance with method ASTM C 356-61 at the temperatures and duration specified in Table I.

4.3.9 Thermal conductivity - Thermal conductivity shall be determined in accordance with method ASTM C 177.

4.3.10 Corrosion-resisting properties - Cement in plastic form shall be applied to a polished steel test plate 4 inches wide and 5 inches long. The test plate shall be of clear finish cold rolled strip steel, 0.020 inch thick, American quality quarter hard, temper No. 3, weighing 0.85 pound per square foot. The cement shall be built up to a 3-inch thickness on the test plate in a wooden mold 4 inches wide and 5 inches long and allowed to stand at room temperature for 30 days. Then the material shall be removed from the test plate. The test plate shall be immediately cleaned with water, wiped dry, and examined for corrosion. Corrosion along the edges of the plate will be disregarded.

4.4 Preparation for shipment - Examination of packing and marking for shipment shall be made for conformance with the requirements of Section 5.

5. PREPARATION FOR DELIVERY

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

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5.1.1 Level A - The cement shall be packed in quantities of 50 pounds in paper shipping sacks conforming to the requirements of UU-S-48, grade X.

5.1.2 Level B - The cement shall be packed in quantities of 50 pounds in paper shipping sacks conforming to the requirements of UU-S-48, grade L/W.

5.1.3 Level C - The cement 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 by the contract or order, marking for shipment shall be 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) Selection of applicable level of packing required (see 5.1)

Custodians:

Army - MO
Navy - Ships
Air Force - MOA

Preparing activity

Navy - Ships
(Project 5640-006)