MIL-C-22608B
9 September 1966
SUPERSEDING
MIL-C-22608A(Wep)
4 February 1964

MILITARY SPECIFICATION

COMPOUND, INSULATING, HIGH TEMPERATURE

This specification is mandatory for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope - This specification covers high temperature insulating compound in a pastelike form that can be applied by troweling, brushing, and spraying after thinning, after which it hardens and forms an insulating coat on the surface of the material to which applied.

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-700	Steel, Sheet and Strip, Medium and High Carbon
RR-S-366	Sieves, Standard for Testing Purposes
TT-P-143	Paint, Varnish, Lacquer, and Related Materials; Packaging, Packing and Marking of

FSC 5640

STANDARDS

Federal

Fed. Test Method Std. No. 141	Paint, Varnish, Lacquer, and Related Materials; Methods of Inspection, Sampling, and Testing

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.

Consolidated Freight Classification Committee Publications

Uniform Freight Classification Rules and Container Specifications for Rail Shipments.

(Application for copies should be addressed to the Consolidated Freight Classification Committee, 202 Union Station, Chicago, Illinois 60606.)

American Trucking Association

National Motor Freight Classification Rules and Container Specifications for Truck Shipments.

(Application for copies should be addressed to the National Classification Board, 1424 Sixteenth Street, N. W., Washington 6, D. C.)

3. REQUIREMENTS

3.1 Preproduction samples - Unless otherwise specified in the contract or order (see 6.2), preproduction samples of the insulation material of the same formulation and manufactured by the same methods and procedures

as proposed for production under the contract shall be furnished as required. The samples shall be tested as specified in Section 4 and are for the purpose of determining that the product, prior to production, meets the requirements for the performance under actual service conditions. Such samples shall be retained with any samples subsequently submitted from production lots.

3.2 Materials - The component materials shall be of such quality that will ensure the production of insulation material which shall satisfy the requirements of this specification. The materials shall be the same as those used in the formulation of the insulation material subjected to the pre-production tests.

3.2.1 Paste compound shall be water-base and may be diluted with water to produce a spraying consistency for application.

3.3 Physical properties -

3.3.1 Specific gravity - The specific gravity of the tested material shall be between 2.01 and 2.09 when tested as specified in 4.6.1.

3.3.2 Percent solids - The total solids content shall be 55 percent plus or minus 3 percent when tested as specified in 4.6.2.

3.3.3 Color - The color of the compound when dry shall have a tan to grey appearance.

3.3.4 Particle size - The material shall pass through a 20 mesh screen conforming to RR-S-366 when tested as specified in 4.6.3. A few small fibers left on the screen shall not be cause for rejection.

3.4 Product characteristics -

3.4.1 Adhesion - A metal panel when coated with insulating material as specified in 4.3.1 shall show no loose particles and no separations from the metal. Hairline cracking or crazing which extends through to the metal may appear when tested as specified in 4.6.4. However, no obvious separation from the metal may occur, such as flaking, chipping, or exposure of patches of bare metal in any way.

3.4.2 Fire and insulation - A coated, steel panel conforming to QQ-S-700, when prepared as specified in 4.3.1 shall show no marked number of lumps or blisters. The temperature rise as recorded on the thermocouple shall be not greater than 104.4° C (220° F) when tested as specified in 4.6.5.

3.5 Workmanship - All details of workmanship shall be in accordance with the best commercial practice covering this type of material.

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 acceptable 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 Classification of tests - The inspection and testing of the compound shall be classified as follows:

(a) Preproduction tests - Preproduction tests are tests conducted, prior to production, on samples of insulating compound, prepared as specified in 4.4.1.1, to determine the compound's capability to meet the requirements of this specification.

(b) Quality conformance tests - Quality conformance tests are those tests performed on the compound manufactured and submitted for acceptance under contract.

4.2.1 Preproduction tests shall consist of all the tests of this specification.

4.3 Test conditions - The laboratory test conditions shall be in accordance with Federal Test Method Standard No. 141 and as specified herein.

4.3.1 Panel preparation - The test panel shall be a 2 by 4 by 1/8 inch piece of cold rolled steel conforming to QQ-S-700. The panel shall be cleaned using a 5 percent aqueous trisodium phosphate solution at 49 to 66° C (120 to 150° F). The panel shall be rinsed with water and then wiped dry with a clean, dry, soft, cotton cloth.

CAUTION

Handle panel with clean, dry, rubber gloves.
Allow panel to remain 1 hour in a desiccator between cleaning and coating.
Do not permit surface to be insulated to come in contact with bare skin

4.3.2 Application of compound to test panel - The insulation compound (approximately 55 percent total solids) shall be applied on the clean metal test panel by the following method: Place the metal panel between two guide bars (3 by 3/16 by 3/16 inches) and place a sufficient amount of the insulating compound on the panel to allow a draw bar to be scraped over the guide bars depositing a 1/16 inch layer of material on the panel. Allow the compound to dry for 16 to 18 hours at normal room temperature, 24 to 27° C (75 to 80° F). Bake the panel in an oven for 2 hours minimum at 91 to 96° C (195 to 205° F).

NOTE

Avoid placing panels in hot air blast to avoid blistering.

The panel shall be allowed to cool to room temperature.

4.4 Examination of product - The compound shall be examined for conformance to the requirements of this specification with respect to material and workmanship.

4.4.1 Sampling -

4.4.1.1 Preproduction sample - After award of a contract but prior to entering production, a preproduction sample of 1 quart of insulation material shall be delivered by the contractor to the procuring activity for evaluation. (Any production started before approval shall be at the contractor's risk.) This insulation material shall be manufactured by the same procedure and processes and at the same location proposed by the contractor for the execution of the contract. When a preproduction sample is received which proves to be satisfactory, the contractor shall be notified and shall be authorized by the procuring activity to proceed with the submission of the product for acceptance. Sample submitted shall become the property of the procuring activity and shall be included in the quantity called for in the contract schedule.

4.4.1.1.1 Preproduction sample for subsequent contracts - The necessity for a preproduction sample shall be determined by the procuring activity when production under a new contract by the same contractor at the same location follows the manufacture of satisfactory material as covered by this specification.

4.4.1.2 Sampling for tests - Samples consisting of two 1-quart containers shall be selected as required by Federal Test Method Standard No. 141.

1.1 Scope. This specification covers general requirements for chain-link

4.4.1.3 Sampling for visual inspection of filled containers - A random sample of filled containers shall be selected in accordance with MIL-STD-105 at Inspection Level I and Acceptable Quality Level of 2.5 percent defective to verify all requirements of this specification in regard to fill, closure, packaging, packing, marking, workmanship, and other requirements not involving tests.

4.5 Lot acceptance tests - Lot acceptance tests shall be in accordance with Method 1031 of Federal Test Method Standard No. 141.

4.5.1 The Government reserves the right to re-run any or all tests of this specification at any time within one year from the date of manufacture of the insulating compound as attested by the date appearing on the container label. Samples for retest shall be taken from previously unopened containers. Should the results of retest be unsatisfactory, the contracting officer shall be so informed, and may require the contractor to remove the entire batch and supply conforming material to replace it.

4.5.2 Packaging, packing, and marking - The packaging, packing and marking shall be examined for compliance with Section 5.

4.6 Test procedures -

4.6.1 Specific gravity - Specific gravity shall be determined as follows:

(a) Weigh a clean, dry, 5 to 10 milliliter pycnometer. Fill the pycnometer with hexane with an initial boiling point of 65 to 69° C (149 to 156° F) or naphtha with an initial boiling point of 103 to 124° C (218 to 255° F) and allow the contents to come to thermal equilibrium. Record the temperature as (t). Refill top capillary portion to compensate for evaporation and obtain a final weight (a) of pycnometer and hexane or naphtha.

(b) A portion of insulating compound shall be extracted from a sample of compound after thorough stirring. This portion shall then be dried and ground to a powder. Between 1 and 2 grams of the powdered sample (c) shall be weighed and transferred to the emptied pycnometer. The pycnometer shall be refilled with hexane or naphtha and shall be placed in a desiccator under vacuum for 10 to 15 minutes to remove all trapped air bubbles; it shall then be removed from the desiccator and shall be allowed to come to equilibrium at room temperature (t). Refill capillary and obtain weight (b).

Specific gravity = $\frac{c}{c-(b-a)}$ x specific gravity of hexane or naphtha at (t).

a = weight of pycnometer filled with hexane or naphtha at (t).
b = weight of pycnometer plus sample and filled with hexane or naphtha at (t).
c = weight of sample

4.6.2 Percent solids - The total solids content shall be determined by the following method: Stir compound thoroughly before sampling.

(a) Weigh 2 grams of insulating compound into a disposable, aluminum weighing dish (2-3/8 inches in diameter and 3/4 inch in depth).

(b) Spread the sample in dish to produce a thin layer.

(c) Dry until successive weighings are within 5 mg. of each other. Drying will be done in a mechanical convection air oven for approximately 16 hours at 70 to 75° C (158 to 167° F). Cool in a desiccator and weigh.

Percent total solids = $\frac{a-b}{c}$ x 100

a = weight of weighing dish and residue.
b = weight of weighing dish.
c = weight of sample.

4.6.3 Particle size - From 100 to 200 grams of insulating compound shall be taken from the sample and placed on a 20 mesh sieve conforming to RR-S-366. Flush the compound through the sieve by means of a stream of water (approximately 2 gallons per minute). Examine any residue left on the screen for foreign particles or any large coarse particles. A few small fibers left on the screen shall not be cause for rejection.

4.6.4 Adhesion - A coated panel, prepared as specified in 4.3.1, shall be suspended, face down, 1/2 inch above a base (by means of steel braces placed at the 2 inch edges of the panel) so that the impact of a slug will bend the panel 5 to 10 degrees. A 2000 gram, steel slug, 9 by 1-1/2 inches with a rounded end of a 3/4 inch radius shall be dropped from a height of 3 feet 6 inches onto the coated panel.

4.6.5 Fire and insulation - Place a coated panel prepared as specified in 4.3.1 in a vertical position with a thermocouple clamped against the center of the back of the panel to record temperature rise. A spring clamp

shall be used which will ensure constant pressure for each successive test. Apply a flame by means of a blowtorch on the insulating material directly opposite the thermocouple for a period of 3 seconds. (See 6.3.) The flame must be held so that the inner cone hits the surface of the insulating compound. The flame is adjusted until the gas valve is completely on and the oxygen valve is turned so that the inner cone should be 1/2 inch in length. The temperature of the flame shall be approximately 2000°C. The temperature of the thermocouple is read and recorded immediately after the 3-second firing.

4.7 Rejection and resubmittal -

4.7.1 Material samples not conforming to the requirements of this specification shall reject the lot or batch represented.

5. PREPARATION FOR DELIVERY

5.1 Packaging and packing - For direct shipment to the Government, the packaging and packing shall be in accordance with TT-P-143. (See 6.2.)

5.2 Marking - Marking shall be in accordance with TT-P-143. Additional marking shall include, "Protect from freezing; Material which has been frozen is unsuitable for use."

6. NOTES

6.1 Intended use - The insulating compound covered by this specification is intended for use as a heat insulator in rocket engines.

6.2 Ordering data - Procurement documents should specify the following:

(a) Title, number, and date of this specification.
(b) Preproduction sampling waiver where applicable (See 4.4.1.1.1).
(c) Selection of applicable levels of preservation, packaging, and packing.
(d) Applicable stock number.

6.3 Blowtorch for conducting fire and ignition test may be obtained from the National Cylinder Gas Company 804 N. Michigan Avenue, Chicago 11, Illinois, identified as Blow-pipe type #3A (natural gas-oxygen) glass.

6.4 Changes from previous issue - The outside margins of this specification have been marked "#" to indicate where changes (deletions, additions, etc.) from the previous issue have been made. This has been done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content as written irrespective of the marginal notations and relationship to the last previous issue.

Custodians:
Navy - AS
Army - MO
Air Force - 69

Preparing activity:
Navy - AS
Project No. 5640-0177

Review activities:
Navy - AS
Army - MO
Air Force - 69

User activities:
Army - MI

NOTICE - Review/user information is current as of date of this document. For future coordination of changes to this document, draft circulation should be based on the information in the current Federal Supply Classification Listing of DOD Standardization Documents.

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
MIL-C-22608B COMPOUND, INSULATING, HIGH TEMPERATURE

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 *(Printed or typed name and activity)*	DATE

DD FORM 1 NOV 64 1426 REPLACES NAVSHIPS FORM 4863, WHICH IS OBSOLETE C-8279

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Naval Air Engineering Center
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Preparing Activity (DD Form 1426) appearing at the end of this