

MIL-S-15204D(SH)
14 August 1984
SUPERSEDING
MIL-S-15204C(SHIPS)
29 September 1972
(See 6.5)

MILITARY SPECIFICATION

SEALING COMPOUND, JOINT AND THREAD, HIGH TEMPERATURE

This specification is approved for use by the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers sealing compounds for use in threaded and fixed mechanical joints in equipment powered by steam or gas at temperatures up to 950 degrees Fahrenheit (°F) and pressure of 1200 pounds per square inch (lb/in²).

1.2 Classification. High temperature sealing compound shall be of the following types, as specified (see 6.2.1):

- Type A - Liquid form for joints and threads.
- Type B - Cement form for joints and threads.
- Type C - Paste form for turbine gunning grooves.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. Unless otherwise specified, the following specifications and standards of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

- PPP-C-96 - Cans, Metal, 28 Gage and Lighter.
- PPP-T-1637 - Tubes, Shipping, Collapsible.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 55Z3, Department of the Navy, Washington, DC 20362 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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STANDARDS

FEDERAL

- FED-STD-123 - Marking for Shipment (Civil Agencies).
- FED-STD-313 - Material Safety Data Sheets, Preparation and the Submission of.

MILITARY

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

(Copies of specifications and standards required by contractors in connection with specific acquisition functions should be obtained from the contracting 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. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable.

ASTM

- D 92 - Flash and Fire Points by Cleveland Open Cup. (DoD adopted)

(Application for copies should be addressed to ASTM, 1916 Race Street, Philadelphia, PA 19103.)

NATIONAL MOTOR FREIGHT TRAFFIC ASSOCIATION, INC., AGENT
National Motor Freight Classification

(Application for copies should be addressed to the National Motor Freight Traffic Association, Inc., ATA TRAFFIC Dept., 1616 "P" Street, NW, Washington, DC 20036.)

UNIFORM CLASSIFICATION COMMITTEE AGENT

Uniform Freight Classification Ratings, Rules and Regulations

(Application for copies should be addressed to the Uniform Classification Committee Agent, Tariff Publication Officer, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

(Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 First article. When specified (see 6.2.1), a sample shall be subjected to first article inspection (see 4.3 and 6.3).

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3.2 Materials.

3.2.1 Type A, liquid form. Type A sealing compound shall be a viscous liquid, based on a phenolic or cresylic synthetic resin.

3.2.2 Type B, cement form. Type B sealing compound shall be composed of type A compound and the addition of an inert filler.

3.2.3 Type C, paste form. Type C sealing compound shall be composed of type A compound and the addition of an inert filler.

3.3 Viscosity.

3.3.1 Type A. The viscosity shall not exceed 40,000 centipoise (see 4.6.1).

3.3.2 Type B. The viscosity shall be not less than 50,000 centipoise nor greater than 200,000 centipoise (see 4.6.1).

3.3.3 Type C. The viscosity shall be not less than 250,000 centipoise nor greater than 700,000 centipoise (see 4.6.1).

3.4 Flash point. The flash point of the sealing compound shall be not less than 120°F (see 4.6.2).

3.5 Solid content. The solid content of the compound shall be not less than 80 percent (see 4.6.3).

3.6 Simulated performance (type C only). There shall be no steam leakage during the simulated performance test (see 4.6.4) at pressures up to 600 lb/in² and temperatures up to 500°F.

3.6.1 Curing (type C only). The cure time shall not exceed 24 hours at the cure temperature recommended by the manufacturer, but the maximum cure temperature shall not exceed 250°F.

3.7 Labeling. Each container shall be clearly labeled with direction for application, date of manufacture, and the storage life (see 5.2 and 5.3).

3.8 Shelf life. Type C compound shall have a shelf life of at least 1 year when stored in accordance with contractor's requirements.

3.9 Material safety data sheet. The contracting activity shall be provided a material safety data sheet (MSDS) at the time of contract award. The MSDS is DD Form OSHA 20 and is found in and part of FED-STD-313. The MSDS shall be included with each shipment of material covered by this specification.

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4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by 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 inspections. The inspection requirements specified herein are classified as follows:

- (a) First article inspection (see 4.3).
- (b) Quality conformance inspection (see 4.5).

4.3 First article inspection. First article inspection shall consist of the tests as specified in 4.6.

4.3.1 Sampling for first article inspection. A 1-quart container shall represent a sample for the tests specified in 4.6.

4.3.2 First article inspection report. The contractor shall prepare a first article inspection report in accordance with the data ordering documents included in the contract or order (see 6.2.2).

4.4 Sampling for quality conformance inspection.

4.4.1 Lot. For purposes of sampling, a lot shall consist of all compounds of the same type from one production batch.

4.4.2 Sampling for examination of filled containers. A random sample of filled containers shall be selected in accordance with table I for the examination specified in 4.5.1.

TABLE I. Sampling for examination of filled containers.

| Lot size number of containers | Sample size number to be examined | Acceptance number (defective) | Rejection number (defective) |
|----------------------------------|--------------------------------------|----------------------------------|---------------------------------|
| Up to 15 | 2 | 0 | 1 |
| 16 to 40 | 3 | 0 | 1 |
| 41 to 65 | 5 | 0 | 1 |
| 66 to 110 | 7 | 0 | 1 |
| 111 to 180 | 10 | 0 | 1 |
| 181 to 300 | 15 | 0 | 1 |
| 301 to 500 | 25 | 1 | 2 |
| 501 to 800 | 35 | 2 | 3 |
| 801 to 1300 | 50 | 3 | 4 |
| 1301 and over | 70 | 4 | 5 |

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4.4.3 Sampling for tests. Ten tubes or a 1-quart container shall represent a sample for the tests specified in 4.5.2.

4.5 Quality conformance inspection.

4.5.1 Examination. Each sample filled container shall be examined to verify conformance with the requirements of this specification. Any container in the sample having one or more defects or under required fill shall be rejected, and if the number of defective containers in any sample exceeds the acceptance number for the appropriate sampling plan, it shall be cause for rejection of the lot represented by the sample.

4.5.2 Quality conformance tests. The samples selected in accordance with 4.4.3 shall be subjected separately to the tests specified in 4.6.1 through 4.6.3. If the sample tested is found not to be in conformance with this specification, it shall be cause for rejection of the lot represented by the sample.

4.6 Tests.

4.6.1 Viscosity. The samples shall be conditioned for a minimum of 2 hours in a water bath maintained at $77 \pm 2^\circ\text{F}$. The viscosity of the compound shall be determined at a temperature of $77 \pm 2^\circ\text{F}$ using a Brookfield viscosimeter model RVT or equivalent. The following speeds (revolutions per minute (r/min)) and spindles shall be used:

| <u>Type</u> | <u>Spindle</u> | <u>Speed (r/min)</u> |
|-------------|----------------|----------------------|
| A | 6 | 20 |
| B | 7 | 20 |
| C | 7 | 4 |

4.6.2 Flash point. The flash point of the compound shall be determined by the Cleveland open cup method in accordance with ASTM D 92.

4.6.3 Solid content. The solid content of the compound shall be obtained as follows: Weigh a number 1-A size coors porcelain crucible and cover to an accuracy of 0.01 gram and record as "tare" for solid content. Place a minimum of 5 or not more than 6 grams of the compound being tested in the bottom of the crucible. This becomes uncured gross weight. Cure by heating in an oven for 2 hours at $200 \pm 5^\circ\text{F}$, followed by 2-1/2 hours at $250 \pm 5^\circ\text{F}$. Remove crucible from oven, cool to room temperature, and again weigh. This becomes the cured weight. The difference between the uncured gross weight and cured weight is the weight loss which is subtracted from the uncured weight to give the solid content.

4.6.4 Simulated turbine casing joint service (type C only). The test shall be conducted in the joints of an apparatus designed to simulate conditions in steam turbine casing joints in actual service use. The faces of the joint shall be machined smooth but shall not be scraped. A half round groove, 3/16-inch deep, shall be milled around the joint face of the lower casing of the apparatus with a dead end 6 inches from a pumping hole. Tapped holes leading to the groove shall be located at regular intervals around the flange of the lower casing of

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the apparatus. Triple boiled linseed oil shall be applied to the faces of the upper and lower casing of the apparatus. The casings shall then be uniformly bolted together. When tested without compound, leakage shall occur from the joint at $300 \pm 10 \text{ lb/in}^2$. The compound shall be forced into the groove through one of the tapped holes by means of a pressure gun. As soon as the compound is emitted from a hole, the hole shall be plugged and more pressure shall be applied until the compound is emitted from a succeeding hole. This procedure shall be followed until all the holes are plugged, thereby assuring that the groove is completely filled with the compound. The apparatus shall then be subjected to superheated steam at practically no pressure so that the casing attains a temperature recommended by the manufacturer (not to exceed 250°F) to assure proper cure of the sealant. The cure time shall also be recommended by the manufacturer, but it shall not exceed 24 hours. The apparatus shall then be subjected to superheated steam at 600 lb/in^2 and 500°F temperature. Every 4 hours during the test, the steam shall be shut off for a 1/2-hour period and the apparatus allowed to cool. At the end of these periods, superheated steam at the same conditions shall be suddenly applied. The test shall continue under this cycle of operation for at least 96 hours. No leakage shall occur from the joint during the test, and on conclusion of the test the joint shall be readily broken. Leakage is defined as condensation detected on a mirror or polished metal plate when placed within 2 inches of the flange area.

4.7 Inspection of packaging. Sample packages and packs, and the inspection of the preservation-packaging, packing and marking for shipment and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

5. PACKAGING

(The preparation for delivery requirements specified herein apply only for direct Government acquisition.)

5.1 Packaging. Packaging shall be level A or C as specified (see 6.2.1).

5.1.1 Level A. Types A and B compound shall be furnished in 5-ounce collapsible tubes or in 2-1/4 pound capacity cans as specified (see 6.2.1). Type C compound shall be furnished in 1-quart, approximately 2.2-pound cans.

5.1.1.1 Tubes. The collapsible tubes shall be as specified in type I, class 1 or 2 of PPP-T-1637 and intermediate packaged in accordance with the appendix thereto. Keys, inside lining, and exterior coatings shall not be required. Tube seal shall be accomplished by means of metal clips.

5.1.1.2 Cans. The cans shall be as specified in type V, class 1 or 2 of PPP-C-96. Exterior plan A coating shall be required.

5.1.2 Level C. Packaging shall afford adequate protection against deterioration and damage during shipment from the supply source to the first receiving activity for immediate use. This level may conform to the contractors commercial practice when such meets the requirements of this level.

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5.2 Packing. Packing shall be level A, B or C as specified (see 6.2.1).

5.2.1 Level A.

5.2.1.1 Tubes. The tubes shall be packed in accordance with the appendix to PPP-T-1637. When specified (see 6.2.1), intermediate fiberboard boxes closed, waterproofed with tape and reinforced in accordance with the appendix to the fiberboard box specification may be used as the shipping container.

5.2.1.2 Cans. The cans shall be arranged and packed in accordance with the overseas requirements of the appendix to PPP-C-96.

5.2.2 Level B.

5.2.2.1 Tubes. The tubes shall be packed in accordance with the appendix to PPP-T-1637. When specified (see 6.2.1), intermediate fiberboard boxes closed, waterproofed with tape and reinforced in accordance with the appendix to the fiberboard box specification may be used as the shipping container.

5.2.2.2 Cans. The cans shall be arranged and packed in accordance with the domestic shipment requirements of the appendix to PPP-C-96. Fiberboard pads shall be required when cans are arranged in tiers.

5.2.3 Level C. Packing shall be accomplished in a manner which will insure acceptance by common carrier and will afford protection to contents against deterioration and damage during direct shipment from the supply source to the using activity for early use. The shipping containers or method of packing shall conform to the National Motor Freight Classification, Uniform Freight Classification Rules and Regulations or other carrier regulations as applicable to the mode of transportation, and may conform to the contractors commercial practice when such meets those requirements.

5.3 Marking. In addition to any special marking required (see 3.7 and 6.2.1), interior packages and exterior shipping containers shall be marked in accordance with MIL-STD-129 for military agencies and FED-STD-123 for civil agencies.

5.3.1 Tubes. Marking of tubes shall be accomplished by lithographing. Contractor commercial colors shall be acceptable.

5.3.2 Warning label. Each unit and intermediate container and exterior containers shall have affixed thereto such warning labels and markings as may be required by DOT regulations.

6. NOTES

6.1 Intended use. This sealing compound is intended for use in threaded and fixed mechanical joints in equipment powered by steam or gas at temperatures up to 950°F and pressures of 1200 lb/in².

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6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Type required (see 1.2).
- (c) If first article inspection is required (see 3.1).
- (d) This material has limited storage life of 1 year (see 3.8).
- (e) Levels of packaging and packing required (see 5.1 and 5.2).
- (f) When intermediate containers need not be overpacked (see 5.2.1.1 and 5.2.2.1).
- (g) Special marking, if required (see 5.3).

6.2.2 Data requirements. When this specification is used in an acquisition which incorporates a DD Form 1423, Contract Data Requirements List (CDRL), the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved CDRL incorporated into the contract. When the provisions of FAR 52.227-7031 are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification is cited in the following paragraph.

| <u>Paragraph no.</u> | <u>Data requirement title</u> | <u>Applicable DID no.</u> | <u>Option</u> |
|----------------------|---------------------------------|---------------------------|---------------|
| 4.3.1 | First article inspection report | DI-T-4902 | ---- |

(Data item descriptions related to this specification, and identified in section 6 will be approved and listed as such in DoD 5000.19L., Vol. II, AMSDL. Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

6.2.2.1 The data requirements of 6.2.2 and any task in sections 3, 4 or 5 of this specification required to be performed to meet a data requirement may be waived by the contracting/acquisition activity upon certification by the offeror that identical data were submitted by the offeror and accepted by the Government under a previous contract for identical item acquired to this specification. This does not apply to specific data which may be required for each contract regardless of whether an identical item has been supplied previously (for example, test reports).

6.3 First article inspection. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection as to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract.

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6.4 Storage and shipment. Type C material has a limited shelf life of 1 year. When ordered, stock quantities should not exceed a 9-month issue requirement. Stocks received, whether shipboard or ashore, should be immediately placed in refrigerated storage, approximately 40°F, only if required by contractor. Shipments should be by the most expeditious mode, and whenever possible, the method of shipment should be such that the material temperature does not exceed 72°F.

6.5 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Preparing activity:
Navy - SH
(Project 8030-N070)

INSTRUCTIONS: In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge (*DO NOT STAPLE*), and mailed. In block 5, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

NOTE: This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

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DEPARTMENT OF THE NAVY

COMMANDER
NAVAL SEA SYSTEMS COMMAND (SEA 55Z3)
DEPARTMENT OF THE NAVY
WASHINGTON, DC 20362



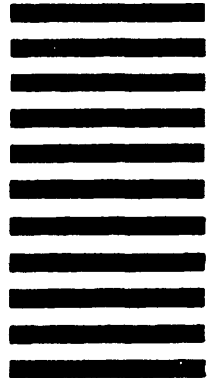
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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL*(See Instructions – Reverse Side)*

| | | | |
|--|--|--|--|
| 1. DOCUMENT NUMBER MIL-S-15204D(SH) | | 2. DOCUMENT TITLE SEALING COMPOUND, JOINT AND THREAD, HIGH TEMPERATURE | |
| 3a. NAME OF SUBMITTING ORGANIZATION | | 4. TYPE OF ORGANIZATION (Mark one) | |
| b. ADDRESS (Street, City, State, ZIP Code) | | <input type="checkbox"/> VENDOR | |
| | | <input type="checkbox"/> USER | |
| | | <input type="checkbox"/> MANUFACTURER | |
| | | <input type="checkbox"/> OTHER (Specify): _____ | |
| 5. PROBLEM AREAS | | | |
| a. Paragraph Number and Wording: | | | |
| b. Recommended Wording: | | | |
| c. Reason/Rationale for Recommendation: | | | |
| 6. REMARKS | | | |
| 7a. NAME OF SUBMITTER (Last, First, MI) – Optional | | b. WORK TELEPHONE NUMBER (Include Area Code) – Optional | |
| c. MAILING ADDRESS (Street, City, State, ZIP Code) – Optional | | 8. DATE OF SUBMISSION (YYMMDD) | |