

INCH-POUND

MIL-PRF-8116D

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SUPERSEDING

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PERFORMANCE SPECIFICATION

PUTTY, GENERAL PURPOSE, NON-HARDENING

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

1. SCOPE

1.1 Scope. This specification covers a general purpose putty compound with corrosion inhibitors.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 or 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3 or 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

Comments, suggestions, or questions on this document should be addressed to: AFLCMC/WNZEB, Robins AFB GA 31098. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.dla.mil>

AMSC N/A

FSC 8030

Distribution Statement A. Approved for public release; distribution is unlimited.

FEDERAL STANDARDS

FED-STD-141	Paint, Varnish, Lacquer and Related Materials, Methods of Inspection, Sampling and Testing
FED-STD-313	Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities

(Copies of these documents are available online at <http://quicksearch.dla.mil/> or <https://assist.dla.mil> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B209	Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM D2369	Standard Test Method for Volatile Content of Coatings
ASTM D381	Standard Test Method for Existent Gum in Fuels by Jet Evaporation
ASTM D471	Rubber Property-Effects of Liquids

(Copies of ASTM standards may be obtained from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959. Electronic copies of ASTM standards may be obtained from <http://www.astm.org>)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein (except for related specification sheets), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First Article. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.2.

3.2 Recycled, recovered, environmentally preferable, or biobased materials. Recycled, recovered, environmentally preferable, or biobased materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.3 Material. The material shall be a non-corrosive, non-drying, non-hygroscopic, adhesive putty-like compound of permanently elastic composition containing corrosion inhibitors, and free from any ingredients which might cause shrinkage by oxidation or evaporation.

3.4 Performance requirements.

3.4.1 Appearance. The compound shall be of uniform composition possessing the same physical properties throughout. No lumps or separated material shall be present when inspected as specified in 4.5.

3.4.2 Non volatile content. The non volatile content shall be no less than 97 percent when tested as specified in 4.7.1.

3.4.3 Consistency. The consistency of the material shall be such as to produce a diameter of spread of not less than 2-1/8 inches nor more than 2-3/8 inches when under a load of 10 pounds for 6 to 7 minutes when tested as specified in 4.7.2.

3.4.4 Shear test. The time required for a lineal shear of the compound between metal strips shall be not less than 4 minutes using a 1000 gram load when tested as specified in 4.7.3.

3.4.5 Resistance to drying and aging. The compound shall not flow, lose adhesion or become embrittled when dried for seven days at a temperature of $180 \pm 5^{\circ}\text{F}$. The loss in weight after seven days shall not exceed 3 percent by weight when tested as specified in 4.7.4.

3.4.6 Removability. A film of the compound subjected to the resistance to drying and aging test (see 4.7.4) shall be removable after not more than 24 hours of immersion in ethyl acetate or other materials as recommended by the manufacturer which are acceptable to the procuring activity when tested as specified in 4.7.5.

3.4.7 Water solubility. The compound shall not be affected by water and shall contain no more than 3 percent water soluble material when tested as specified in 4.7.6.

3.4.8 Fuel contamination. The non-volatile extractable materials contributed by the compound in contact with the fuel, shall not exceed 60 milligrams per 100 milliliters. No more than a slight discoloration shall result on a freshly polished copper strip hung in the contaminated fuel during the 48 hour extraction period when tested as specified in 4.7.7.

3.4.9 Resistance to salt water and hydrocarbons. A finished panel partially immersed in a two layer liquid consisting of a 3 percent solution of sodium chloride in water and 30 percent aromatic hydrocarbon test fluid for not less than seven days at a temperature maintained at 95 to 100 °F, shall not show film failure or evidence of corrosion on the metal when tested as specified in 4.7.8

3.4.10 Storage stability. The manufacturer shall furnish the procuring agency with certification that the putty furnished has a minimum shelf life of three years, at which time the putty shall be capable of passing the minimum requirements of this specification.

3.5 Environmental conditions.

3.5.1 Hazardous materials. The primer shall not contain chlorinated solvents or hydrolyzable chlorine derivatives. Also, the primer shall not contain or require for application any EPA Class I Ozone Depleting Substances/Chemicals or hazardous materials as defined in FED-STD-313. Nor shall the primer contain any chemical listed in the current report of known carcinogens of National Toxicology Program (see 4.8.1).

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First Article inspection (see 4.2).
- b. Conformance inspection (see 4.3).

4.2 First Article Inspection. First Article inspection shall consist of all the inspections and tests as specified in paragraphs 4.5 and 4.7.1 through 4.7.8.

4.2.1 First Article procedures. Upon successful completion of all testing requirements as specified herein, the contractor shall provide a certified test report showing that the material conforms to all requirements of this document. The report shall be forwarded to AFLCMC/WNZEB, Robins AFB GA 31098. Upon review and acceptance of the test report, the government will provide approval to the contractor as a qualified source.

4.3 Conformance inspection. Conformance inspection, when specified (see 6.2), shall consist of all the inspections and test as specified in paragraphs 4.5 and 4.7.1 through 4.7.8.

4.3.1 Lot size and sampling. For purposes of sampling for conformance inspection, a lot shall consist of putty from one batch offered for delivery at one time. Samples of putty from each lot shall be selected as specified in FED-STD-141, Method 1022.

4.4 Requirements cross-reference matrix. Table 1 provides a cross-reference matrix of the Section 3 requirements tested or verified in the paragraphs below.

TABLE 1. Requirements Cross-Reference Matrix

REQUIREMENT	VERIFICATION
3.4.1	4.5
3.4.2	4.7.1
3.4.3	4.7.2
3.4.4	4.7.3
3.4.5	4.7.4
3.4.6	4.7.5
3.4.7	4.7.6
3.4.8	4.7.7
3.4.9	4.7.8

4.5 Visual examination for defects. Each of the putty samples shall be inspected visually to verify compliance with this specification. Any sample containing one or more defects as defined in Table 2 shall be cause for rejection of the lot represented by that sample.

TABLE 2. Visual Examination for Defects

Critical	None defined
Major	Composition not uniform Putty contains lumps Putty has separated material
101	
102	
103	
Minor	None defined

4.6 Test panels. The test panels specified in Table 3 shall be required for tests. The 1 by 4 and 3 by 6 inch panels of alclad aluminum alloy shall have a 1/8 inch diameter hole centered on a line ¼ inch from one end of the panel and a line shall be inscribed across the width of the panels exactly one inch from the same end (holed end). The panels shall be cleaned in accordance with FEDSTD-141, Method 2013, paragraph 4.3, (for panels not to be anodized).

TABLE 3. Required Test Panels

Quantity	Material	Approximate Size	Nominal Thickness
1	Aluminum Alloy, 2024-T3, ASTM B209	3 x 6 in.	0.020 in.
6	Alclad Aluminum Alloy, 2024-T3, ASTM B209	1 x 4 in.	0.012 in.
4	Alclad Aluminum Alloy, 2024-T3, ASTM B209	3 x 6 in.	0.020 in.
2	Alclad Aluminum Alloy, 2024-T3, ASTM B209	2-1/2 x 3 in.	0.020 in.

4.6.1 Application of coating. Coatings shall be applied to test panels with a suitable spreader to permit depositing a uniform film of approximately 1/32 inch in thickness on the panels. All aluminum panels shall be coated entirely on one side except for a one inch strip across the top of the panel. A fairly uniform film of compound shall first be spread from the inscribed line to the opposite end of the panel, allowing a slight excess which will be squeezed out by the spreader.

4.7 Test procedures.

4.7.1 Non-volatile content. The non-volatile content shall be determined in accordance with ASTM D2369 (see 3.4.2).

4.7.2 Consistency. Three 25 gram samples of compound, weighed to the nearest 0.1 gram, shall be rolled into balls with the hands. The consistency shall be determined at room temperature by placing one of the sample balls between two glass plates and applying a load of 10 pounds for 6 to 7 minutes. The load shall be applied evenly and vertically by means of a suitable fixture, such as the Williams Plastometer, having freely moving parallel plates. The greatest diameter of the spread of the compound shall be measured and the average of the three samples shall be reported. This diameter shall be measured from the wetted area (see 3.4.3).

4.7.3 Shear test. Three pairs of 1 by 4 by 0.012 inch 2024 Alclad aluminum panels shall be coated in accordance with 4.6.1 so as to deposit a uniform film. Each pair of panels shall be placed with the coated areas together and with uncoated areas at opposite ends. The panels shall be pressed together under a load of 10 pounds for 5 to 6 minutes, using a suitable fixture, such as the Williams Plastometer, to apply the load evenly and vertically. The excess compound shall be removed from all edges. The panels shall be suspended at the upper end and a 1000 gram load applied to the lower end. The number of seconds that the panels suspend the weight shall be recorded and the average of three trials shall be reported (see 3.4.4).

4.7.4 Resistance to drying and aging. Two weighed 3 by 6 inch 2024 Alclad aluminum panels shall be coated to the scribed line (see 4.6) and reweighed to obtain the weight of applied compound. The panels shall be supported in an upright position with the uncoated end downward and shall be heated for 7 days in an oven at a temperature of $180 \pm 5^{\circ}\text{F}$. After cooling, the panels shall be reweighed and the average loss in weight calculated. The panels shall show no flow over the inscribed line and no loss of adhesion or embrittlement (see 3.4.5).

4.7.5 Removability. A coated panel which has been subjected to the resistance to drying and aging tests shall be immersed for 24 hours in ethyl acetate or other cleaning material recommended by the manufacturer for removal of the aged coating. The panel shall then be examined for completeness of removal. The compound shall either be completely dissolved or loosened from the metal to leave a clean surface. There shall be no corrosion apparent on the metal (see 3.4.6).

4.7.6 Water solubility. Two weighed 3 by 6 inch 2024 Alclad aluminum panels shall be coated with compound and reweighed after drying to constant weight at a temperature of $150 \pm 5^{\circ}\text{F}$. The panels shall then be suspended in distilled water at a temperature of $150 \pm 5^{\circ}\text{F}$ for two hours and again dried to constant weight at $150 \pm 5^{\circ}\text{F}$. From the loss in weight calculate the average percent

of water soluble material (see 3.4.7).

4.7.7 Fuel contamination. Each of two 2-1/2 by 3 inch 2024 Alclad aluminum panels shall be coated on a 2 by 2-1/2 inch area. The panels shall be given a lengthwise bend and shall be placed in an upright position on the 2-1/2 inch edge in a wide mouthed pint jar having a screw cap. Hang a bright copper strip in the jar and cover the panels and strip with 250 milliliters of 30 percent aromatic hydrocarbon test fluid conforming to ASTM D471, Type III. A sample of the test fluid shall be taken at the same time for a blank determination. Cover the jar and allow to stand for 48 hours at room temperature. Two 50 milliliter samples of the contaminated fuel shall be decanted off and the non-volatile gum residue determined in accordance with ASTM D381. The nonvolatile material shall be placed in an appropriate bath maintained constantly at a temperature of 570 ± 10 °F for 30 minutes. After cooling in a closed container, the beakers shall be weighed and the stoved gum residue calculated for 100 milliliters of the contaminated fuel
Necessary

corrections shall be made for preformed gums already present in the test fuel from the blank determination. The copper strip should show no more than a slight discoloration (see 3.4.8).

4.7.8 Resistance to salt water and hydrocarbon. A 3 by 6 inch 2024 aluminum alloy panel shall be coated on one side using the spreader. Apply a similar coat to the other side with a spatula and coat the exposed edges. After two hours exposure to the air, the panel shall be immersed vertically for not less than 7 days in a covered glass vessel containing a two layer liquid, consisting of a 3 percent aqueous sodium chloride solution and the aromatic hydrocarbon test fluid (ASTM D471, Type III) so that 2 inches of the panel are exposed to the salt mixture, 2 inches of the panel exposed to the aromatic test fluid and the balance of the panel exposed to the air-vapor mixture. The temperature during the test shall be maintained at 95 to 100 °F. Immediately upon removal from the liquid, the compound on the panel shall be examined for softening, blistering, leaching and loss of adhesion. There shall be no corrosion apparent on the metal (see 3.4.9).

4.8 Environmental conditions tests.

4.8.1 Hazardous materials verification. The MSDS shall certify that the primer contains no EPA Class I Ozone Depleting Substances, hazardous materials IAW FED-STD-313, or any known carcinogens (see 3.5.1).

5. PACKAGING

5.1 Packaging requirements. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The compound covered by this specification is intended for use as a general purpose sealer for cracks, small voids, pinholes, and seams where a corrosion inhibiting type material is required. This material is not for use as a fuel tank or pressure cabin sealant.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this performance specification.
- b. First Article, if required (see 4.2).
- c. Conformance inspection, if required (see 4.3).
- d. Packaging requirements (see 5.1).
- e. Material safety data sheets, if required (see 6.3).

6.3 Material Safety Data Sheets. When specified (see 6.2) Material Safety Data Sheets will be provided in accordance with FED-STD-313.

6.4 Key Words.

Adhesive
Elastic
Ethyl Acetate
Ethyl Alcohol
Hygroscopic
Non-Corrosive
Non-Drying
Oxidation

6.5 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

Custodians:

Army - MR
Navy - SH
Air Force - 84

Preparing Activity:

Air Force - 84

Reviewers:

Army - MI
Navy - MC
Air Force - 99

Agent:

Air Force - 99

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NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.dla.mil>.