MIL-P-8116B
26 April 1965

Superseding
MIL-P-8116A(USAF)
25 April 1963

MILITARY SPECIFICATION

PUTTY, ZINC CHROMATE, GENERAL PURPOSE

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

1. SCOPE

1.1 Scope. This specification covers a zinc chromate putty compound with asbestos filler.

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

QQ-A-355	Aluminum Alloy Plate and Sheet 2024
QQ-A-362	Aluminum Alloy Plate and Sheet, Alclad 2024
TT-S-735	Standard Test Fluids, Hydrocarbon
PPP-C-96	Cans, Metal, 28 Gage and Lighter

STANDARDS

Federal

FED-STD-141	Paint, Varnish, Lacquer and Related Materials, Methods of Inspection, Sampling and Testing
FED-STD-791	Lubricants, Liquid Fuels, and Related Products, Methods of 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 supplier 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 Classification Committee

Uniform Freight Classification Rules

(Application for copies of these freight classification rules should be addressed to the Consolidated Classification Committee, 202 Chicago Union Station, Chicago 6, Illinois.)

3. REQUIREMENTS

3.1 Material. The material shall be a non-corrosive, non-drying, non-hydroscopic, adhesive putty-like compound of permanently elastic composition containing corrosion inhibiting zinc chromate and asbestos fiber, and free from any ingredients which might cause shrinkage by oxidation or evaporation.

3.2 Chemical and physical properties.

3.2.1 Appearance. The compound shall be of uniform composition possessing the same physical properties throughout. No lumps or separated material shall be present.

3.2.2 Non-volatile content. The non-volatile content shall be no less than 97 percent.

3.2.3 Pigment. The total pigment content shall be no less than 36 percent nor more than 41 percent. The pigment shall show on analysis:

Acid insoluble	45.0 percent minimum
CrO_3	0.95 percent minimum

The acid insoluble portion shall be identified as asbestos.

3.2.4 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 4.6.3.

3.2.5 Shear test. The time required for a lineal shear of the compound between the metal strips (see 4.6.4), shall be not less than 4 minutes (240 seconds) using a 1000 gram load.

3.2.6 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 degrees Fahrenheit (82 degrees Centigrade). The loss in weight after seven days shall not exceed 3.0 percent by weight when tested as specified in 4.6.5.

3.2.7 Removability. A film of the compound subjected to the resistance to drying and aging test (see 4.6.6) 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.

3.2.8 Water solubility. The compound shall not be affected by water and shall contain no more than 3 percent water soluble material (see 4.6.7).

3.2.9 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 (see 4.6.8).

3.2.10 Resistance to salt water and hydrocarbon. A finished panel partially immersed in a two layer liquid consisting of 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 degrees Fahrenheit (35 to 38 degrees Centigrade), shall not show film failure or evidence of corrosion on the metal (see 4.6.9).

3.2.11 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.

4. QUALITY ASSURANCE PROVISIONS

4.1 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 specifications where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Lot size. For purposes of sampling, a lot shall consist of putty from one batch offered for delivery at one time.

4.3 Sampling. Samples of putty from each lot shall be selected as specified in Federal Test Method Standard No. 141, Method 1021.

4.4 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 shall be cause for rejection of the lot represented by that sample.

Table I. Visual examination for defects

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

4.5 Test panels. The test panels specified in Table II shall be required for tests. The 1 by 4 and 3 by 6 inch panels of alclad aluminum alloy shall have a 0.125 inch hole centered on a line 0.25 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 with alcoholic phosphoric acid in accordance with Federal Test Method Standard No. 141, Method 2013.

Table II. Required test panels

Number	Material	Approximate Size	Nominal Thickness
1	Aluminum Alloy, QQ-A-355	3 x 6 in.	0.020 in.
6	Alclad Aluminum Alloy, QQ-A-362	1 x 4 in.	0.012 in.
4	Alclad Aluminum Alloy, QQ-A-362	3 x 6 in.	0.020 in.
2	Alclad Aluminum Alloy, QQ-A-362	2½ x 3 in.	0.020 in.

4.5.1 Application of coating. Unless otherwise specified herein, coatings shall be applied to test panels with a doctor blade type spreader fabricated from acrylic plastic. The spreader shall have a clearance of 0.031 inch in order to permit depositing a uniform film of approximately 1/32 inch in thickness on the 0.020 inch thick 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 by means of a stiff bladed spatula, allowing a slight excess which will be squeezed out by the spreader. The material shall not be rolled or handled in the hands during this application. The panels shall be placed on a level surface such as a glass plate in order that the spreader may produce a more uniform film thickness. The panel shall be held firmly to prevent movement during application. The spreader shall be placed at the uncoated end of the panel and sufficient force applied with the heel of the hand to keep the legs of the spreader flat on the level surface while it is slowly pushed to the other end of the panel. The excess compound shall be trimmed from the edges of the panel before the panel is removed from the surface. The spreader may be cleaned by wiping with a cloth dampened with ethyl alcohol.

4.6 Test procedures.

4.6.1 Non-volatile content. The non-volatile content shall be determined in accordance with Method 4041 of Federal Test Method Standard No. 141 except that a 3 to 5 gram sample shall be used.

4.6.2 Pigment analysis.

4.6.2.1 Total pigment content. Weigh accurately 10 grams of compound into each of four weighed centrifuge tubes. Add 40 milliliters of the extraction solvent recommended by the manufacturer and allow tubes to stand overnight. Mix thoroughly with a glass rod, wash the rod with more of the extraction solvent and add a sufficient amount to nearly fill and balance the tubes. Place the tubes in a centrifuge and whirl until the pigment is well settled. Decant the clear supernatant liquid. Add more solvent and repeat the extraction as above at least three times. Set the tubes on top of a warm oven for 20 minutes and then heat in an oven at a temperature of 221 degrees to 230 degrees Fahrenheit (105 degrees to 110 degrees Centigrade) for two hours. Cool in a dessicator, weigh and calculate the percentage of pigment.

4.6.2.2 Reagents. The reagents specified in Table III are required for the acid insoluble and chromate determinations.

Table III. Reagents for pigment analysis

Quantity (ml)	Reagent	Concentration
5	Ethyl alcohol	95%
15	Hydrochloric acid	1:1
100	Hydrochloric acid	1%
20	Hydrochloric acid	1:3
25	Sulfuric acid	95%
10	Nitric acid	70%
10	Perchloric acid	70%
100	Potassium permanganate	0.1 N
10	Silver nitrate	2.5 g/l
100	Ammonium persulfate	20%
100	Ferrous Ammonium sulfate solution consisting of 4 g. of $FeSO_4(NH_4)SO_4 \cdot 6H_2O$ 10 ml of 1:1 H_2SO_4 90 ml of water	

4.6.2.3 Acid insoluble. To two of the centrifuge tubes from the total pigment content determination, add 5 milliliters of ethyl alcohol and 15 milliliters of 1:1 hydrochloric acid and agitate with a glass stirring rod to entirely disperse the sample. Wash the sample into a beaker using about 75 milliliters of hot water. Warm on a steam bath for two hours to complete solution of the soluble material. Filter through a medium porosity weighed alundum crucible and wash with hot 1.0 percent hydrochloric acid. Dry the residue for one hour in an oven at a temperature of 221 degrees to 230 degrees Fahrenheit (105 to 110 degrees Centigrade), Cool and weigh. This residue shall be examined visually and shall be identified as asbestos.

4.6.2.4 Chromate. To two of the centrifuge tubes from the total pigment content determination, add 10 milliliters of warm 1:1 sulfuric acid, agitate with a glass stirring rod to entirely disperse the sample and add a little water to complete the loosening of the sample in the tube. Wash into a beaker using about 60 milliliters of perchloric acid and fume lightly on a hot plate for five minutes. The solution should show a characteristic chrome yellow color. Excessive fuming is not desirable as it may produce anhydrous chromium sulfate, which is difficult to dissolve. Cool, cautiously dilute with water to 300 milliliters, stir, add beads to prevent bumping and heat to boiling. To the boiling solution add approximately 1 milliliter of 0.1 N potassium permanganate and 10 milliliters of silver nitrate solution. Then slowly add 20 percent ammonium persulfate solution. The hot solution should show the usual permanganate color. If this color does not develop,

or if it disappears, add more persulfate. When the permanganate color is permanent, continue the boiling for 10 to 15 minutes to destroy excess persulfate. Then add 5 milliliters of 1.3 hydrochloric acid and boil for 5 to 8 minutes to reduce the oxidized manganese. The color now should be the usual chromate yellow. Cool to room temperature and titrate with 0.1 N ferrous ammonium sulfate, adding a measured excess of about 5 milliliters after the appearance of the deep grass green color. Back titrate with 0.1N potassium permanganate to the first permanent pink color which lasts for 30 seconds. Calculate the chromium as CrO_3 on the basis of the pigment.

4.6.3 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 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.

4.6.4 Shear test. Three pairs of 1 by 4 by 0.012 inch panels shall be coated using the spreader 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 by one hole at 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.

4.6.5 Resistance to drying and aging. Two weighed 3 by 6 inch panels conforming to QQ-A-362 shall be coated 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 degrees Fahrenheit (82 degrees Centigrade). 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.

4.6.6 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. The cleaning compound or cleaning process shall not cause corrosion of the metal.

4.6.7 Water solubility. Two weighed 3 by 6 inch panels conforming to QQ-A-362 shall be coated with compound and reweighed after drying to constant weight at a temperature of 150 degrees Fahrenheit (66 degrees Centigrade). The panels shall then be suspended in distilled water at a temperature of 150 degrees Fahrenheit (66 degrees Centigrade) for two hours and again dried to constant weight at 150 degrees Fahrenheit. From the loss in weight calculate the average percent of water soluble material.

4.6.8 Fuel contamination. Each of two 2½ by 3 inch panels shall be coated on a 2 by 2½ inch area. The panels shall be given a lengthwise bend and shall be placed in an upright position on the 2½ 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 TT-S-735, 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 by Method 3302.7 of Federal Test Method Standard No. 791 at a temperature of 320 degrees to 329 degrees Fahrenheit (160 degrees to 165 degrees Centigrade). The non-volatile material shall be placed in an appropriate bath maintained constantly at a temperature of 572 plus or minus 9 degrees Fahrenheit (300 plus or minus 5 degrees Centigrade) 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.

4.6.9 Resistance to salt water and hydrocarbon. A 3 by 6 inch aluminum alloy panel conforming to QQ-A-355 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 3.0 percent aqueous sodium chloride solution and the aromatic hydrocarbon test fluid(TT-S-735, 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 degrees to 100 degrees Fahrenheit (35 degrees to 38 degrees Centigrade). 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.

4.7 Inspection of preparation for delivery. The packaging, packing and marking shall be examined to determine compliance with Section 5 of this specification. Sampling shall be conducted in accordance with MIL-STD-105, inspection level II, and the AQL shall be 2.5 percent defective.

5. PREPARATION FOR DELIVERY

5.1 Packaging. Packaging shall be level A or level C as specified (see 6.2).

5.1.1 Level A. The sealant shall be packaged in two pound or ten pound metal containers as specified in the contract or order. The containers shall be round multiple friction top cans conforming to PPP-C-96.

5.1.2 Level C. Unless otherwise specified in the contract or order, packaging shall be in accordance with the manufacturer's commercial practice.

5.2 Packing. Packing shall be level A, level B, or level C as specified (see 6.2).

5.2.1 Level A. Sealant packaged as specified in 5.1.1 shall be packed in accordance with the appendix of PPP-C-96 for overseas shipment.

5.2.2 Level B. Sealant packaged as specified in 5.1.1 shall be packed in accordance with the appendix of PPP-C-96 for domestic shipment.

5.2.3 Level C. Sealant packaged as specified in 5.1.2 shall be packed in a manner to insure carrier acceptance and safe delivery at the lowest rate to the point of delivery. Containers shall be in accordance with the requirements of Consolidated Freight Classification Rules in effect at the time of shipment or regulations of other carriers applicable to the mode of transportation. Fiberboard, when used, shall have a minimum bursting strength of 275 pounds per square inch. The gross weight of the exterior container when packed for shipment shall not exceed approximately 200 pounds.

5.3 Marking. In addition to any special marking required by the contract or order, unit packages and shipping containers shall be marked in accordance with the requirements of MIL-STD-129 and shall include the cleaning material recommended by manufacturer for removal of putty (see 4.5.6). The item description shall be as follows:

PUTTY, ZINC CHROMATE, GENERAL PURPOSE, SPECIFICATION MIL_P-8116B

6. NOTES

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 Ordering data. Procurement documents should specify the following:

a. Title, number and date of this specification.

b. Required size of container(see 5.1).

c. Selection of applicable levels of packaging and packing.

6.3 The material shall be purchased by weight, the units being two pound or ten pound containers at 25 degrees Centigrade (77 degrees Fahrenheit).

Custodians:

Army - MR
Navy - SH
Air Force - 69

Preparing Activity:

Air Force - 69

Review Activities:

Army - MI, MR

User Activities:

Army - MO
Navy - MC

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

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 BY *(Printed or typed name and activity)* | DATE

DD FORM 1 APR 63 1426 REPLACES NAVSHIPS FORM 4863, WHICH IS OBSOLETE C-8870

FOLD

POSTAGE AND FEES PAID

OFFICIAL BUSINESS

Standardization Branch (MCNSS)
MCNIA BAFB, Alabama 36615

FOLD