

MIL-D-9063B (ASG)

23 JULY 1965

Superseding  
MIL-D-9063A (ASG)  
3 April 1964

MILITARY SPECIFICATION

DESEALANT, INTEGRAL FUEL AND OIL TANKS

This specification has been approved by the Department of the Air Force and by the Bureau of Naval Weapons.

1. SCOPE

1.1 Scope.-- This specification covers desealing materials for aircraft integral fuel and oil tanks that do not have faying surface rubber.

1.2 Classification.-- The desealant material shall be of the following types, as specified (see 6.3):

- Type I - Desealant (dissolving type) suitable for recirculating spray or fill and drain operations, or both.
- Type II - Desealant (bond release type) suitable for fill and drain operations only.
- Type III - Desealant suitable for spot removal.

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-A-250/4	Aluminum Alloy 2024, Plate and Sheet
QQ-A-250/5	Aluminum Alloy Alclad 2024, Plate and Sheet
QQ-A-250/13	Aluminum Alloy Alclad 7075, Plate and Sheet
QQ-P-416	Plating, Cadmium (Electrodeposited)
QQ-S-698	Steel, Sheet and Strip, Low-Carbon
PPP-D-705	Drum, Metal, Shipping, Steel (over 12 and under 55 Gallon)
PPP-D-729	Drums, Metal, 55-Gallon (for Shipment of Non-Corrosive Material)
PPP-P-704	Pails, Shipping, Steel (1 through 12 Gallon)

FSC 8030

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Military

MIL-S-4383	Sealing Compound, Topcoat, Fuel Tank, Buna-N Type
MIL-J-5624	Jet Fuel, Grades JP-4 and JP-5
MIL-S-7124	Sealing-Compound, Pressure-Cabin
MIL-A-8625	Anodic Coatings, for Aluminum and Aluminum Alloys
MIL-S-8802	Sealing Compound, Temperature-Resistant, Integral Fuel Tanks and Fuel Cell Cavities, High-Adhesion

STANDARDSMilitary

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.)

3. REQUIREMENTS

3.1 Qualification.- The desealant furnished under this specification shall be a product which has been subjected to and which has passed the qualification tests specified herein, and which has been listed on or approved for listing on the applicable Qualified Products List.

3.2 Homogeneity.- When tested as specified in 4.5.1, the desealant shall show no sign of skins, lumps, gels, or liquid separation. Settled matter shall not exceed 10 percent by volume and it shall be dispersible by a single inversion of the graduated cylinder.

3.3 Toxicity.- The desealant shall contain no ingredients which are deemed to be toxicologically hazardous when used in a manner and under conditions prescribed.

3.4 Viscosity.- When tested in accordance with 4.5.2, the absolute viscosity for type III material shall be a minimum of 10,000 and a maximum of 25,000 centipoises at 77° ±2° F.

3.5 Flammability.- When subjected to the test specified in 4.5.3, the sealant shall not continue to burn longer than 3 seconds after removal of the flame.

3.6 Residue corrosion.- When tested as specified in 4.5.4, the material shall not corrode the aluminum foil dishes to an extent that they show a weight loss greater than 2.0 milligrams (mg) more than the average weight loss of the control dishes, nor shall there be any visual evidence of pitting or etching.

3.7 Immersion corrosion.- The material shall not corrode the following specimens to an extent that they show a weight change greater than that indicated, when tested as specified in 4.5.5:

Clad 7075-T6 aluminum alloy (QQ-A-250/13),	2.0 mg
Bare 2024-T3 aluminum alloy (QQ-A-250/4),	2.0 mg
Anodized 2024-T3 aluminum alloy (MIL-A-8625, type I, uncolored),	2.0 mg
Cadmium plated steel (QQ-P-416),	10.0 mg
Carbon steel (QQ-S-698),	10.0 mg

Minor discoloration shall not be cause for rejection.

### 3.8 Desealing ability.-

3.8.1 Type I and type II.- The average time required for type I and type II material to remove each of the sealants from test specimens shall be no greater than 4 hours when tested as specified in 4.5.6.

3.8.2 Type III.- When tested as specified in 4.5.6, the type III materials shall be capable of loosening each of the sealants from the test panels sufficiently to permit easy removal by a suitable type scraper.

3.9 Reusability (type I).- The final desealing time required shall not exceed 4 hours and 45 minutes. The weight change of corrosion specimens tested with the used desealant shall not exceed the value indicated in 3.7, nor shall there be any visual evidence of pitting or etching of channels or cap liners when tested in accordance with 4.5.7.

3.10 Rinsability of contaminated desealants.- There shall be no visible residue remaining on the test panels when tested as specified in 4.5.8, 4.5.6.3.1, and 4.5.6.3.3.

3.11 Storage stability.- The desealant shall meet all the requirements of section 3 after 6 months' storage at 75° ±5° F.

3.12 Workmanship.- The workmanship shall be in accordance with high-grade manufacturing 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 inspections.- The examining and testing of desealant shall be classified as:

- (a) Qualification inspections (4.3)
- (b) Quality conformance inspections (4.4)

### 4.3 Qualification inspections (see 6.4).-

4.3.1 Sampling instructions.- The qualification samples shall consist of the following amounts of desealant according to the type or types (see 1.2) for which qualification is desired:

- (a) Type I only - 4 gallons in 1-gallon or 2-gallon containers.
- (b) Types I and II desealant to be qualified for both type I and II  
- 10 gallons in 5-gallon containers.
- (c) Type II only - 10 gallons in 5-gallon containers.
- (d) Type III - 2 gallons in 1-gallon containers.

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Samples shall be identified with the manufacturer's own part number and any additional information required by the letter of authorization. Containers shall be of the same material as that which is to be used in packaging the desalant.

4.3.1.1 In addition to the qualification test samples, the manufacturer shall furnish the following:

- (a) A certified statement specifically identifying each ingredient in the desalant by recognizable chemical or proprietary name, source, and percentage. (The Government may run such tests as are deemed necessary either on test samples or procured material to verify composition.)
- (b) A test exhibit with the following data:
  - (1) Results of all qualification tests, except storage stability.
  - (2) Directions for rinsing (see 3.10 and 4.5.8).

4.3.2 Qualification required.- Prior to actual procurement, the product which this specification covers shall pass the qualification inspections specified herein. If the product is later modified in any way, the modified form shall be subjected to and shall pass the same qualification inspections.

4.3.3 Inspections.- Qualification inspections of the desalant shall consist of all inspections of this specification described under 4.5. Type I desalant shall pass the inspections specified in 4.5.1 through 4.5.5.

4.4 Quality conformance inspections.- Quality conformance inspections shall consist of sampling plan tests.

4.4.1 Sampling plan tests.-

4.4.1.1 Batch.- A batch shall consist of all of the desalant produced at one operation under the same conditions, the weight or volume of which may vary, depending upon the manufacturer's facilities.

4.4.1.2 Sampling plan.- When five batches or less of the desalant are required to fill an order, a sufficient quantity of the desalant shall be taken from each batch to produce a 1-gallon composite sample. This sample shall immediately be placed in a clean, dry, air- and water-tight container which shall be sealed and marked for identification. When more than five batches are required, the batches shall be grouped together to form not less than three and not more than five lots. Each lot shall contain approximately the same number of batches. A sufficient quantity of the desalant shall be taken from each batch in any one lot to produce a 1-gallon composite sample which shall be prescribed as described above. The selected samples shall be subjected to the following tests:

- (a) Homogeneity (4.5.1)
- (b) Viscosity - type III only (4.5.2)
- (c) Flammability (4.5.3)
- (d) Residue corrosion (4.5.4)
- (e) Immersion corrosion, excluding the corrosion test required on used desalant in 4.5.7 (4.5.5)
- (f) Descaling ability (4.5.6)

4.4.1.3 Rejection and retest.— Failure of any sample to meet the specified inspections shall be cause for rejection of the batches or lots represented. Before resubmitting, the contractor shall fully explain to the activity responsible for qualification both the corrections made and the cause of previous rejections.

#### 4.5 Inspection methods.—

4.5.1 Homogeneity.— Five hundred milliliters (ml) of thoroughly agitated desealant shall be poured into a 500-ml, glass-stoppered graduated cylinder. The sample shall be allowed to stand for 4 weeks at room temperature and not exposed to sunlight, after which it shall be examined for evidence of skins, lumps, gels, or separation into two or more liquid phases.

4.5.2 Viscosity.— The viscosity of the type III materials shall be determined using a Brookfield Viscosimeter, Model LVF, in a 600-ml, long-form beaker filled 3/4 full at 77° ±2° F. Readings should be taken after the spindle has operated for a minimum of 3 minutes. The determinations should be made using a No. 4 spindle at 30 revolutions per minute (rpm).

#### 4.5.3 Flammability.—

4.5.3.1 Preparation of panel.— One end of a clean, anodized aluminum-alloy panel, 4 by 3/4 inches, shall be held at an angle of approximately 45 degrees. The desealant shall be poured along the upper edge of the panel, allowing the desealant to drain freely over the surface. Desealant settling on the reverse side of the panel shall be wiped clean before preceeding with the test.

4.5.3.2 Procedure.— A micro-burner flame, not exceeding 3/16 inch in length shall be passed, within a 2-second period, back and forth along the lower edge of the panel. This operation shall be repeated three times at 3-second intervals. If the desealant ignites, the burner flame shall be removed and observation shall be made to ascertain whether the desealant continues to burn. The above procedure shall be repeated on another similarly prepared panel, except that it shall be placed in an oven for 15 minutes at 113° ±4° F. The panel shall then be removed from the oven and subjected to the flame test.

4.5.4 Residue corrosion.— Six aluminum-foil moisture dishes, measuring approximately 2-1/4 inches in diameter, shall be cleaned by immersing for 15 minutes in a boiling solution of chromic and phosphoric acids (21 grams (g) of chromic acid and 36 g of 85 percent phosphoric acid per liter). The dishes shall then be rinsed free of acid, dipped in hot methanol, and allowed to flash dry, after which they shall be weighed to the nearest 0.1 mg. Three ml of desealant shall be placed in each of three of these dishes. Three ml of distilled water shall be placed in each of the other three dishes (control). The dishes shall then be placed in an oven maintained at 100° ±2° F for 24 hours. A convection-type oven with provisions for venting shall be used. At the end of the 24-hour period, the dishes shall be removed and placed in a 100 percent static humidity chamber ( a desiccator partially filled with water) for 1 week at 100° ±2° F. They shall then be removed, rinsed with tapwater, subjected to the same cleaning treatment as described above, and reweighed.

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#### 4.5.5 Immersion corrosion.-

4.5.5.1 Preparation of test panels.- All panels referred to in this paragraph shall be 2 inches long, 1 inch wide, and 1/32 inch thick. Six numbered panels of low-carbon steel conforming to QQ-S-698, shall be cleaned on all surfaces with 200-mesh pumice wet with isopropyl alcohol. They shall then be dipped in hot acetone, allowed to flash dry, and be weighed. Four panels of cadmium-plated steel conforming to QQ-P-416 shall be cleaned by wiping with acetone followed by vapor degreasing in trichloroethylene, after which they shall be flash dried and weighed. Four panels each of clad 7075-T6 aluminum alloy conforming to QQ-A-250/13, and bare 2024-T3 aluminum alloy conforming to QQ-A-250/4, shall be cleaned by immersing for 15 minutes in a boiling solution of chromic and phosphoric acids (21 g of chromic acid and 36 g of 85 percent phosphoric acid per liter). The panels shall then be rinsed free of acid, dipped in hot methanol, flash dried, and weighed. Four panels of aluminum alloy, conforming to QQ-A-250/4, anodized in conformance with MIL-A-8625, type I, uncolored, shall be dipped in hot methanol, flash dried, and weighed. Two of the low-carbon steel panels shall be retained in a desiccator to serve as controls for final cleaning operations.

4.5.5.2 Test procedure.- Two percent, by volume, of distilled water shall be added to the desecant for this test. Quadruplicate panels of each metal shall be immersed in 50 ml of desecant contained in separate tall-form, 2-ounce glass bottles having aluminum-foil lined screw tops. There shall be one panel per jar. The jars shall be placed in an oven maintained at 100° ±2° F for 7 days. At the end of this period, the panels shall be removed, washed with a stream of water, dipped in hot acetone, and flash dried. All panels, except those of low-carbon steel, shall be weighed. The average weight changes shall not exceed the values specified in 3.7. The exposed and control panels of low-carbon steel shall be immersed for 15 minutes at boiling temperature in a solution containing 50 g per liter of citric acid (pH adjusted to 10 at 77° F with ammonium hydroxide). The panels shall be rinsed in distilled water, dipped in hot acetone, allowed to flash dry, and weighed. The average weight changes of the exposed carbon steel panels shall not exceed the average change of the control panels by more than the values specified in 3.7.

#### 4.5.6 Desealing ability (type I, type II, and type III).-

##### 4.5.6.1 Preparation of specimens.-

4.5.6.1.1 Type I and type II.- Four channels having an inside width of 1 inch, a length of 12 inches, and an inside depth of 1/8 inch shall be formed from 0.020- to 0.025-inch alclad aluminum alloy, conforming to QQ-A-250/5, annealed, condition 0. The channels shall be cleaned by immersing 15 minutes in a boiling solution of chromic and phosphoric acids (21 g of chromic acid and 36 g of 85 percent phosphoric acid per liter). They shall be rinsed free of acid, dipped in hot methanol, and allowed to flash dry. Pressure-sensitive tape shall then be applied to both ends of each channel to serve as dams. Two channels shall then be filled with sealing compound conforming to MIL-S-8802 and the other two channels filled with sealing compound conforming to MIL-S-7124. The sealants shall be prepared and applied in accordance with the manufacturer's directions. Channels shall be filled level with the top edges. The sealant in the channels shall be air cured for 3 days at 75° ±5° F. The channels shall be placed in an oven maintained at 120° ±2° F for 2 days, after which they shall be removed from the oven, cooled, and cut into 7/8-inch lengths. A hole shall be made in each specimen and a stainless steel wire inserted to suspend the specimen as shown

on figure 1. Each specimen shall be given a single dip coat of sealing compound conforming to MIL-S-4383 to produce a film between 0.5 and 1.5 mils thick. The solids content of the topcoat material used shall be cured by suspending or placing vertically for 48 hours in a draft-free enclosure to reduce the tendency toward blister formation.

4.5.6.1.2 Type III.- Twelve panels made of alclad aluminum alloy conforming to QQ-A-250/5, measuring 2 by 3 by 0.032 inches and having a 1/8-inch hole at one end shall be coated a thickness of 30 - 60 mil with sealants conforming to MIL-S-8802 and MIL-S-7124. The panels shall be stored at  $75^{\circ} \pm 5^{\circ}$  F for 3 days followed by baking at  $120^{\circ}$  for 2 days. The specimens shall be topcoated with a sealing compound conforming to MIL-S-4383, as described in 4.5.6.1.1.

4.5.6.2 Fuel aging of type I specimens.- The specimens shall be placed in pint jars (similar to Atlas "E-Z Seal" type) containing 350 ml of JP-4 fuel conforming to MIL-J-5624. The jars shall be tightly closed, using a rubber gasket to prevent evaporation of fuel from the jars, and shall be placed in an oven maintained at  $120^{\circ} \pm 2^{\circ}$  F for 4 days. Specimens shall then be removed from the jars and allowed to drip dry for 1-1/2 hours, after which they shall be placed in an oven maintained at  $120^{\circ} \pm 2^{\circ}$  F for 5 hours. At the end of this period, the specimens shall be air cooled for 1-1/2 hours. Thirty-six specimens shall be placed in each jar.

#### 4.5.6.3 Test procedures.-

4.5.6.3.1 Type I.- Three specimens, 7/8 inches long, of each sealant, prepared as specified in 4.5.6.1 and fuel-aged as specified in 4.5.6.2, shall be suspended in 8-ounce, tall-form, wide-mouth bottles, as shown on figure 1. One hundred ml of desealant shall be poured into each bottle. The bottles shall be capped, allowed to stand 5 minutes, and the caps again tightened. The bottles shall be placed in a shaking machine with the longitudinal axis parallel to the direction of shaking. The desealing test shall be conducted at  $75^{\circ} \pm 5^{\circ}$  F. The shaking machine shall be started and operated at  $260 \pm 20$  strokes per minute; the length of the strokes shall be 2-1/2 inches. The sealant specimens shall be visually examined until the sealant is completely removed. The removal time shall be recorded to the nearest 15 minutes. The times required for complete sealant removal shall be averaged. The desealant shall be retained for tests as specified in 4.5.7. The test specimens shall be removed from a desealant upon completion of the test and rinsed in a stream of tap water at  $75^{\circ} \pm 5^{\circ}$  F. These rinsed panels shall be examined for evidence of residue.

4.5.6.3.2 Type II.- Three specimens of each sealant shall be placed on the bottom of a wide-mouth jar. They shall be completely covered by 100 ml of desealant. The jars shall be capped and allowed to stand at  $75^{\circ} \pm 5^{\circ}$  F for 4 hours. The test specimens shall be removed from the desealant upon completion of the test period and rinsed in a stream of tap water at  $75^{\circ} \pm 5^{\circ}$  F. These rinsed panels shall be examined for evidence of residue.

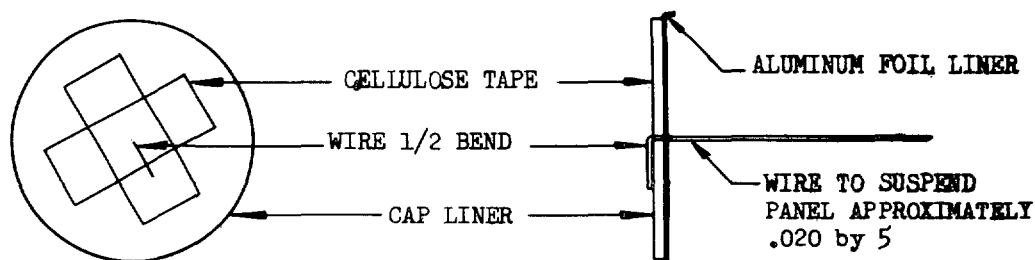
4.5.6.3.3 Type III.- Three panels prepared as described in 4.5.6.1.2 shall be immersed in the desealant to be tested, removed, and suspended vertically for 30 minutes in a closed, empty container, after which they shall be immersed in the test compound, removed, and suspended in the closed, empty container for 15 minutes. At the end of the second period, the sealant shall be loosened sufficiently to permit its complete removal without visible damage to the aluminum surface, using a micarta-type scraper. The panels shall be rinsed in a stream of tap water at  $75^{\circ} \pm 5^{\circ}$  F and examined for evidence of residue.

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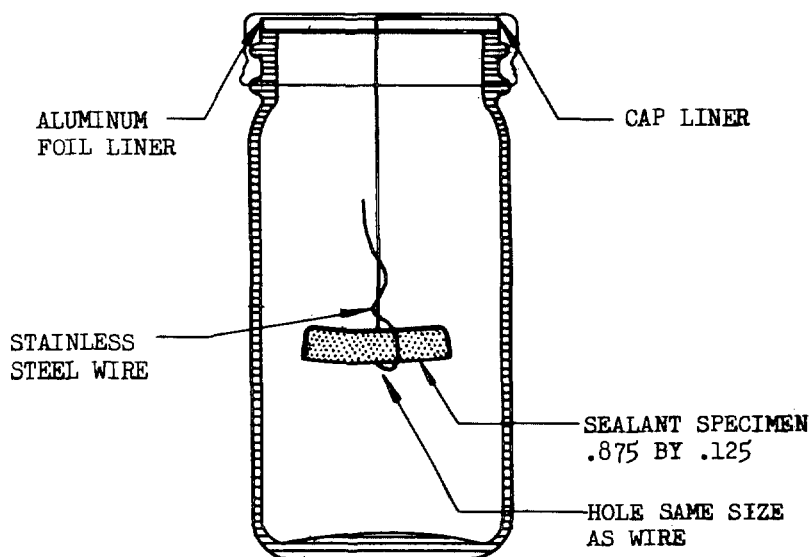
CAP LINER WITH  
WIRE AFFIXED

SIDE VIEW OF CAP

LINER AND WIRE

(PRIOR TO AFFIXING  
SAMPLE TO WIRE)

COMPLETED ASSEMBLY



THE CAP LINER IS BEST REMOVED FROM THE CAP BY MEANS OF A VACUUM SUCTION.

THE ALUMINUM FOIL LINER IS MADE SLIGHTLY LARGER THAN THE INNER PORTION OF THE CAP SO IT EXTENDS ABOUT .016 DOWN THE SIDE OF THE CAP.

DIMENSIONS IN INCHES.

FIGURE 1. Desealing ability (type I) test bottle

**4.5.7 Reusability (type I).**— The used desealants from 4.5.6.3 shall be mixed together in a 1/2-gallon bottle and allowed to settle for at least 12 hours at  $75^{\circ} \pm 5^{\circ}$  F. Nine hundred and sixty ml of the supernatant portion of this mixture shall be decanted into another jar and 240 ml of fresh desealant added. The resulting 1,200 ml of contaminated desealant shall be used to repeat the desealing test specified in 4.5.6. The above mixing procedure shall then be repeated and a third desealing operation accomplished. The average removal time for the final reuse shall not exceed the value specified in 3.9. The immersion corrosion test specified in 4.5.5 shall be repeated on fresh samples of the three types of aluminum panels and the cadmium plate specified in 4.5.5.1, utilizing the final used desealant. The average weight loss of the aluminum and aluminum-plated panels shall not exceed the values specified in 3.7. The channels shall also be examined visually for pitting and etching. The remainder of the desealant shall be retained for the rinsability test specified in 4.5.8.

**4.5.8 Rinsability of contaminated desealants.**— Used desealant from 4.5.7 shall be agitated separately to suspend the sludge. Following the agitation, the desealants shall be poured over separate 3- by 6-inch panels of alclad 2024-T3 aluminum, previously cleaned by immersing for 15 minutes in a boiling solution of chromic and phosphoric acids (21 g of chromic acid and 36 g of 85 percent phosphoric acid per liter), rinsing free of acid, dipping in hot methanol, and flash drying. One sample of each desealant contaminated during the last desealing operation with each of the four desealants shall be used. After the desealant has been poured over the panels, they shall be air dried and suspended in an oven at  $100^{\circ} \pm 2^{\circ}$  F for 30 minutes. They shall then be rinsed with tapwater at a temperature up to  $90^{\circ}$  F (to be specified by the manufacturer).

**4.5.9 Storage stability.**— One-half of each qualification test sample submitted (see 4.5.1) shall be stored at  $75^{\circ} \pm 5^{\circ}$  F for 6 months in the as-received condition. At the end of this period, the samples shall be subjected to the tests in 4.5.4 and 4.5.5.

**4.6 Packaging, packing, and marking.**— Preparation for delivery shall be examined for conformance to section 5.

## 5. PREPARATION FOR DELIVERY

**5.1 Packaging and packing.**— Packaging and packing shall be level A, B, or C, as specified (see 6.3).

**5.1.1 Levels A and B.**— Type I and type II desealants shall be packaged and packed in accordance with PPP-D-729, type II. Type III desealants shall be packaged and packed in accordance with PPP-D-729, type II, PPP-D-705, or PPP-P-704, as specified by the procuring activity.

**5.1.2 Level C.**— Desealants shall be packaged and packed in accordance with manufacturer's commercial practice.

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5.2 Marking of shipments.- All containers shall be marked in accordance with MIL-STD-129. The identification shall be composed of the following information listed in the order shown:

DESEALANT, INTEGRAL FUEL AND OIL TANKS  
 MIL-D-9063B  
 Stock No.  
 Type  
 Date of manufacture of batch  
 Must be used before \_\_\_\_\_ 1/

1/ Insert date 6 months after date of manufacture of batch.

## 6. NOTES

6.1 Intended use.- The desealant is intended for the removal of sealant materials from aircraft fuel and oil tanks and is classified by types according to the method of application desired, the type of equipment being used, and the aircraft materials (rubber) which will be exposed to the desealant.

6.2 Precaution against mixing.- Desealants of different types, or from different manufacturers should not be mixed as they are not necessarily compatible.

6.3 Ordering data.- Procurement documents should specify:

- (a) Title, number, and date of this specification.
- (b) Type required (see 1.2).
- (c) Quantity per container (type III).
- (d) Quantity required (see 6.3.1).
- (e) Point of inspection.
- (f) Level of packaging and packing required (see 5.1).

6.3.1 The desealant will be purchased by volume, the unit being a U.S. standard gallon at 77° F. Due to the unstable corrosion characteristics of this material, the quantity of desealant procured must be limited to a 30-day supply or the deliveries so scheduled that only a 30-day supply is maintained.

6.4 Qualification.- With respect to products requiring qualification, awards will be made only for such products as have, prior to the time set for opening of bids, been tested and approved for inclusion in the applicable Qualified Products List whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Bureau of Naval Weapons, Navy Department, Washington, D. C. 20360; however, information pertaining to qualification should be obtained from the Director, Aircraft Materials Laboratory, Naval Air Engineering Center, Philadelphia, Pa. 19112.

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**Custodians:**

Navy - WP

Air Force - (11)

**Reviewer activities:**

Navy -

Air Force -

**Preparing activity:**

Navy - WP