

MIL-L-23398D  
20 November 1985  
SUPERSEDING  
MIL-L-23398C  
26 March 1982  
MIL-L-46147A  
13 April 1978

## MILITARY SPECIFICATION

LUBRICANT, SOLID FILM, AIR - CURED, CORROSION INHIBITING,  
NATO CODE NUMBER S-749

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

### 1. SCOPE

1.1 Scope. This specification establishes the requirements for two types of air-cured solid film lubricant (identified by NATO code number S-749) (see 6.5) intended to reduce wear and prevent seizing, corrosion and galling (see 6.1). The lubricant can be applied by dipping, brushing or spraying.

1.2 Classification. The lubricant shall be of the following types, as specified (see 6.2.1):

Type I - Bulk dispersion  
Type II - Aerosol propelled

### 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.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to Systems Engineering and Standardization Department (Code 93), Naval Air Engineering Center, Lakehurst, NJ 08733-5100, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.
---

FSC 9150

DISTRIBUTION STATEMENT A, Approved for public release, distribution is unlimited

AMSC N/A

## MIL-L-23398D

## SPECIFICATIONS

## FEDERAL

PPP-B-601	-	Boxes, Wood, Cleated-Plywood
PPP-B-621	-	Boxes, Wood, Nailed and Lock Corner
PPP-B-636	-	Boxes, Shipping, Fiberboard
PPP-C-96	-	Can, Metal, 28 Gage and Lighter
QQ-A-250/5	-	Aluminum Alloy Alclad 2024, Plate and Sheet
TT-N-95	-	Naphtha, Aliphatic
VV-D-1078	-	Damping Fluid, Silicone Base (Dimethyl Polysiloxane)

## MILITARY

MIL-C-372	-	Cleaning Compound, Solvent for Bore of Small Arms and Automatic Weapons
MIL-L-2104	-	Lubricating Oil, Internal Combustion Engine, Heavy Duty
MIL-S-5059	-	Steel, Corrosion Resistant (18-8) Plate, Sheet and Strip
MIL-T-5624	-	Turbine Fuel, Aviation, Grades JP-4 and JP-5.
MIL-A-8243	-	Anti-Icing and Deicing-Defrosting Fluid.
MIL-A-8625	-	Anodic Coatings, for Aluminum and Aluminum Alloys
DOD-P-16232	-	Phosphate Coating, Heavy, Manganese or Zinc Base (for Ferrous Metals)
MIL-L-23699	-	Lubricating Oil, Aircraft Turbine Engines, Synthetic Base
MIL-T-81533	-	1,1,1 - Trichloroethane (Methyl Chloroform) Inhibited, Vapor Degreasing
MIL-H-83282	-	Hydraulic Fluid, Fire Resistant Synthetic Hydrocarbon Base, Aircraft

## STANDARDS

## FEDERAL

FED-STD-313	-	Material Safety Data Sheets, Preparation and Submission of
FED-STD-791	-	Lubricant, Liquid Fuel 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
MIL-STD-147	-	Palletized Unit Loads

2.1.2 Other Government documents, drawings, and publications The following other Government documents form a part of this specification to the extent specified herein.

## MIL-L-23398D

## PUBLICATIONS

## CODE OF FEDERAL REGULATIONS

## 49CFR - Transportation

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, DC 20402)

(Copies of specifications, standards, handbooks, drawings, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the acquisition 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.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 270 -	Sampling Petroleum and Petroleum Products
ASTM D 1193 -	Reagent Water.
ASTM D 2510 -	Adhesion of Solid Film Lubricants
ASTM D 2511 -	Thermal Shock Sensitivity of Solid Film Lubricants
ASTM D 2625 -	Endurance (Wear) Life and Load-Carrying Capacity of Solid Film Lubricants (Falex Method)
ASTM D 2649 -	Corrosion Characteristics of Solid Film Lubricants.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103 )

(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 Qualification. The lubricant furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4 3 and 6 3) Any change in the formulation of a qualified product will necessitate its requalification

3.2 Materials. Component materials used in the manufacture of this lubricant shall consist essentially of finely powdered lubricating solids dispersed in a suitable binder The lubricant shall be suitable for application by brushing, dipping or by spraying (Type I), or spraying (Type II) The lubricant shall contain a fast drying vehicle at spraying consistency that is capable of being cured within 6 hours at  $25^{\circ} \pm 2^{\circ}\text{C}$  ( $77^{\circ} \pm 3^{\circ}\text{F}$ ). For Type II materials, a fluorocarbon type pressure producing agent approved by the EPA is required to

## MIL-L-23398D

expel the contents of the container in accordance with the requirements of this specification. Type II lubricant shall be sprayable at a distance of 254 to 356 mm (10 to 14 inches). Both Type I and Type II lubricants shall contain no graphite, powdered metal or fluorocarbon solvents not approved by the EPA (see 4.6.1).

3.3 Film appearance and thickness The bonded solid film lubricant, when examined in accordance with 4.6.2, shall appear uniform in color and shall be smooth, free from any cracks, scratches, pinholes, blisters, bubbles, runs, sags, foreign matter, grit, rough particles, separation of ingredients or other surface imperfections. The thickness of the cured film shall be between 0.005 and 0.013 mm (0.0002 and 0.0005 inch). The film thickness shall be determined in accordance with 4.6.

### 3.4 Performance characteristics.

3.4.1 Film adhesion The bonded solid film lubricant, when tested as specified in 4.6, shall not be lifted to expose any bare metal surface. A uniform deposit of powdery material clinging to the tape shall not be objectionable.

3.4.2 Resistance to fluids The bonded solid film lubricant, after immersion in each of the fluids as specified in 4.6, shall not be lifted to expose any bare metal surface, nor shall the solid film lubricant soften, lift, blister, crack or peel. A uniform deposit of powdery material clinging to the tape shall not be objectionable.

3.4.3 Thermal shock sensitivity. The bonded solid film lubricant, when tested as specified in 4.6, shall not flake, crack, nor soften and shall conform to the requirements for film adhesion in 3.4.1.

3.4.4 Endurance life. When tested in accordance with 4.6, the bonded solid film lubricant shall have an average endurance life of 60 minutes at 1,000 pounds load (4,500 pounds gage). No test result shall be less than 50 minutes.

3.4.5 Load-carrying capacity When tested in accordance with 4.6, the bonded solid film lubricant shall have a load-carrying capacity of at least 2,500 pounds gage load, with no single test result less than 2,250 pounds for phosphated surfaces and at least 2,250 pounds gage load, with no single test result less than 2,000 pounds for grit blasted surfaces.

3.4.6 Aluminum corrosion resistance When subjected to heat and high humidity conditions as specified in 4.6, the bonded solid film on anodized aluminum panels shall not show or cause discoloration, pitting, formation of white deposits, or other evidence of corrosion.

3.4.7 Sulfurous acid - salt spray When steel specimens coated with the dry film lubricant are exposed to sulfurous acid - salt spray in accordance with 4.6, there shall be no resultant pitting, visible corrosion or staining.

3.4.8 Spray duration and pattern (Type II only) When the Type II solid film lubricant is tested as specified in 4.6.3, the spray pattern shall be a minimum of 38.1mm (1.5 inches) in width and shall be effective for a minimum of 270 seconds. The effective spray is that spray which carries the lubricative pigment i.e., pigment together with resin needed for bonding.

## MIL-L-23398D

3.4.9 Storage stability. The fluid lubricant after a minimum storage period as specified in 4.6.4 shall conform to the requirements for endurance life, 3 4 4, and the sulfurous acid - salt spray, 3.4.7, when tested in accordance with 4 6.

### 3.5 Total solids.

3.5.1 Lubricant in non-pressurized cans. Lubricant supplied in non-pressurized cans shall contain a minimum of 24 percent by weight of total solids unless otherwise specified in the contract or purchase order. The test shall be performed in accordance with 4.6 5.1.

3.5.2 Lubricant in gas-pressurized cans. Each gas-pressurized can shall contain a minimum of 30 grams of total solids. The test shall be performed in accordance with 4.6.5.2.

3.6 Material Safety data sheets. Material safety data sheets shall be prepared in accordance with FED-STD-313. Material safety data sheets shall also be forwarded as specified in 4.3 1.

## 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 inspections specified herein are classified as follows:

- a. Qualification inspection (see 4.3)
- b. Quality conformance inspection (see 4.4)
- c. Inspection of packaging (see 4.7)

4.3 Qualification inspection. The qualification inspection performed by the qualification laboratory shall consist of approval of the manufacturer's submitted report, and subjecting the qualification samples, 4 3.1, to examination and testing for all the requirements of this specification (see Table I)

4.3.1 Qualification samples. The qualification samples shall consist of 1-gallon of the lubricant dispersion from one batch provided in 1-quart containers of sprayable consistency for Type I and six aerosol cans for Type II, as applicable, and two copies of the supplier's report for each product for which qualification is desired. The report shall show the product inspection results for all the requirements of this specification and shall refer specifically to the applicable paragraphs in the specification. The samples, reports and material

## MIL-L-23398D

safety data sheets (see 3.6) shall be forwarded to Aircraft and Crew Systems Technology Directorate, Code 60612, Naval Air Development Center, Warminster, PA 18974. The samples shall be plainly identified by securely attached durable tags or labels marked with the following information:

Sample for qualification inspection  
 LUBRICANT, SOLID FILM, AIR-CURED, CORROSION INHIBITING,  
 NATO CODE NUMBER S-749  
 Name of manufacturer  
 Product code number  
 Date of manufacture  
 Submitted by (name) (date) for qualification inspection in  
 accordance with MIL-L-23398D under authorization of (reference  
 authorizing letter) (see 6.3)

4.3.2 Retention of qualification In order to retain qualification of a product approved for listing on the Qualified Products List (QPL), the manufacturer shall verify by certification to the qualifying activity, that the manufacturer's product complies with the requirements of this specification. The time of periodic verification by certification shall be in two-year intervals from the date of original qualification. The Government reserves the right to re-examine the qualified product whenever deemed necessary to determine that the product continues to meet any or all of the specification requirements.

4.4 Quality conformance inspection. The quality conformance inspection shall consist of inspection of samples for tests (see 4.4.2) for all of the tests specified in Table I, (except for thermal shock sensitivity (3.4.3), aluminum corrosion resistance (3.4.6) and storage stability (3.4.9)). Samples shall be labeled completely with information identifying the purpose of the sample, name of product, specification number, lot and batch number, date of sampling and contract number.

4.4.1 Lot and batch All lubricant manufactured as one batch shall be considered a lot and shall be numbered as such for purposes of inspection. A batch is defined as the end product of all the raw materials mixed or blended in a single operation.

4.4.2 Sample for tests The sample for tests shall consist of 4 individual quarts of lubricant or six aerosol cans, as applicable, selected in accordance with ASTM D 270. The lot shall be unacceptable if a sample fails to meet any of the test requirements specified.

#### 4.5 Inspection

4.5.1 Inspection of materials Perform inspection of material in accordance with method 9601 of FED-STD-791.

4.5.2 Inspection conditions Unless otherwise specified, all examinations and tests shall be performed at a temperature of  $25^{\circ} \pm 3^{\circ}\text{C}$  ( $77^{\circ} \pm 5^{\circ}\text{F}$ ) and at a relative humidity between 45 and 55 percent. Physical values specified in 3.4.4 and 3.4.5 apply to the average of the determinations made on the samples.

## MIL-L-23398D

**4.5.3 Preparation of test panels.** Samples of the lubricant in sprayable form shall be used to prepare bonded solid film lubricant specimens on test panels in accordance with this application procedure. The panels shall be made from: aluminum alloy conforming to QQ-A-250/5, anodized to conform to MIL-A-8625, Type I, and measuring approximately 0.020 by 3 by 6 inches; and corrosion resistant steel conforming to MIL-S-5059, composition 321, condition-annealed, finish no. 2 dull, and measuring approximately 0.036 by 3 by 6 inches. Prior to the application of the lubricant, the panels shall be precleaned with naphtha conforming to TT-N-95. Application shall be performed in a well-ventilated area or hood, where no flames or ignition sources are present. Only one side of each panel shall be fully coated, except for two of the anodized aluminum panels which shall have the lubricant applied to a 1-inch wide strip to enable measurement of film thickness. A spray application technique shall be used to coat the panels for the tests specified herein. The solid film lubricant thickness, after cure, shall be 0.005 to 0.013 mm (0.0002 to 0.0005 inch). Three coats shall be the maximum number required to obtain the desired film thickness. An air drying temperature,  $25^{\circ} \pm 3^{\circ}\text{C}$  ( $77^{\circ} \pm 5^{\circ}\text{F}$ ), for ten minutes between coats, shall be allowed. After the final coat has been applied, the coated specimens shall be allowed to air dry for 6 hours.

**4.6 Methods of inspection.** Methods of inspection shall be in accordance with Table II and 4.6.1 through 4.7.

**4.6.1 Graphite and powdered metal.** The contractor shall submit a notarized certification signed by a responsible official of its management, attesting that no graphite or powdered metal are present in the product furnished under this specification.

**4.6.2 Film appearance.** The bonded solid film lubricant specimens shall be examined visually and microscopically at a magnification of 12X for uniformity in color, smoothness and evidence of cracks, scratches, pinholes, blisters, bubbles, runs, sags, foreign matter, grit, rough particles, separation of ingredients and any other surface imperfection.

**4.6.3 Spray duration and pattern (Type II only).** A new unused spray container shall be selected. A sheet of lined white paper, approximately 9 by 11 inches, shall be fastened in a vertical position. A pattern shall be sprayed across the paper with the valve held open, holding the spray container not less than 9 inches nor more than 12 inches from the paper. With the valve fully open, the time required to complete the effective spray shall be determined with the aid of a stop watch. The width of the spray pattern shall be estimated by comparison to lines on the white paper which are 38.1mm (1.5 inches) apart.

**4.6.4 Storage stability.** Set aside a one-quart Type I or 2 cans Type II, as applicable, qualification sample in a storage of  $25^{\circ} \pm 3^{\circ}\text{C}$  ( $77^{\circ} \pm 5^{\circ}\text{F}$ ) for a minimum period of 1 year  $\pm 7$  days. At the end of the storage period, determine the endurance life of the cured lubricant, 3.4.4, and the sulfurous acid - salt spray, 3.4.7.

**4.6.5 Total solids.**

**4.6.5.1 Bulk material.** Stir the lubricant thoroughly to provide a uniform dispersion. Weigh 1 to 3 grams of the lubricant into a weighing dish with a diameter of approximately 64 mm (2.5 inches). Place the dish and contents in a

## MIL-L-23398D

force draft oven maintained at  $49^{\circ} \pm 3^{\circ}\text{C}$  ( $120^{\circ} \pm 5^{\circ}\text{F}$ ) for  $18 \pm 1$  hours. Remove the dish and contents from the oven, place them in a desiccator, and allow them to cool to  $25^{\circ} \pm 3^{\circ}\text{C}$  ( $77^{\circ} \pm 5^{\circ}\text{F}$ ). Remove the dish and contents from the desiccator and weigh them. Repeat the procedure to constant weight. Calculate the percent by weight of the solid material in the fluid lubricant from the formula:

$$\frac{\text{Weight of solid material (in grams)}}{\text{Weight of sample (in grams)}} \times 100 = \text{Percent total of solids}$$

4.6.5.2 Net weight (solids) (Type II only). The sheet of paper used in 4.6.3 to observe the spray pattern shall be weighed before and after the contents of the spray can have been deposited. The difference in weights represents the amount of lubricant plus binder solids deliverable from the spray can.

4.7 Inspection of packaging.

4.7.1 Quality conformance inspection of packaging.

4.7.1.1 Unit of product. For the purpose of inspection, a completed pack prepared for shipment shall be considered a unit of product.

4.7.1.2 Sampling. Sampling for examination shall be in accordance with MIL-STD-105.

4.7.1.3 Examination. Samples selected in accordance with 4.7.1.2 shall be examined for the following defects. The AQL shall be 2.5 percent defective.

No.	Defect	A	B	Comm
101	Type I unit containers not the size specified.	5.1.1.1		5.1.1.1
102	Type II unit container not the size specified.	5.1.1.1		5.1.1.2
103.	Type I unit containers not multiple friction plug cans.	5.1.1.1		5.1.1.1
104.	Type II unit containers pressurized can.	5.1.1.3.1		5.1.1.2
105	Construction of unit containers not as specified.	5.1.1.3.1 5.1.1.3.2		5.1.1.4
106	Quantity of Type II lubricant in intermediate container not as specified.	5.1.2		5.1.2
107	Intermediate container not as specified	5.1.2.1		5.1.2.2
108.	Type I lubricant not packed as specified.	5.2.1.1	5.2.2.1	5.2.3
109	Type II lubricant not packed as specified.	5.2.1.2	5.2.2.2	5.2.3
110.	Marking not as specified	5.3	5.3	5.3
111	Palletization not as specified.	5.4	5.4	5.4



## MIL-L-23398D

## 5. PACKAGING

5.1 Preservation. Preservation shall be level A or commercial as specified (see 6.2).

5.1.1 Level A.

5.1.1.1 Type I. The lubricant shall be furnished in 1-quart or 1-gallon multiple friction plug metal cans specified in PPP-C-96, Type V, Class 2. Interior coatings, as applicable, shall be as specified therein. Exterior coatings, including side seam stripping, shall be as specified therein for plan B. Wire handles as specified therein, shall be provided for the 1-gallon container. Closure of the filled cans shall be as specified in the appendix thereto.

5.1.1.2 Type II. The lubricant shall be furnished in a 16 ounce, pressurized metal can in accordance with PPP-C-96, Type IX, class 2. Each can shall contain a stirring device such as a marble or a steel ball.

5.1.2 Commercial. Unit containers of the types specified in 5.1.1.1 and 5.1.1.2, shall be those containers normally used for products of this nature providing there will be no interaction chemically or physically with the contents so as to damage the container or alter the strength, quality or purity of the contents.

5.1.3 Intermediate containers. Intermediate containers shall be provided for the Type II, aerosol propelled cans only. Level A intermediate containers shall be in accordance the appendix to PPP-C-96 with interlocking, full height partitions to provide cushioning. Commercial intermediate containers shall be snug-fitting corrugated fiberboard boxes in accordance with the Code of Federal Regulations, Title 49.

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

5.2.1 Level A.

5.2.1.1 Type I. The Type I lubricant shall be packed in accordance with the level A, "filled unpackaged cans" requirements of PPP-C-96. The cans shall be packed in the quantities and arrangements specified therein.

5.2.1.2 Type II. The Type II lubricant, shall be packed in snug-fitting boxes complying with the requirements of PPP-B-601, overseas type of PPP-B-621, class 2. The quantity of intermediate containers per box shall be 12, arranged 2 x 2 x 3, for a total of 288 spray cans. The box closure and strapping shall be as specified in the applicable box specification or the appendix thereto, except that the strapping shall be flat and the finish "B."

5.2.2 Level B.

5.2.2.1 Type I. The Type I lubricant, shall be packed in accordance with the level B, "filled unpackaged cans" requirements of PPP-C-96. The cans shall be packed in the quantities and arrangements specified therein.

## MIL-L-23398D

5 2 2 2 Type II The Type II lubricant, shall be packed in snug-fitting fiberboard boxes complying with the requirements of PPP-B-636, grade V3C or W5C, style RSC. Two such intermediate containers shall be packed in each shipping container for a total of 48 spray cans.

5 2 3 Commercial. Type I lubricant and Type II lubricant shall be separately packed in fiberboard boxes in accordance with the applicable requirements of Code of Federal Regulations, Title 49. The 1-quart, Type I lubricant shall be packed 12 per shipping container. The 1-gallon, Type I lubricant shall be packed 4 per shipping container. The 16 ounce spray Type II lubricant shall be packed 48 per shipping container, two intermediate containers of 24 each.

5 3 Marking Marking shall be in accordance with MIL-STD-129 and shall include the additional special markings requirements as specified by the acquiring activity. Unit and intermediate containers, including unit containers that serve as shipping containers, shall be marked with the applicable precautionary marking detailed in ANSI Z129.1. In addition to any special markings required by the contract, each container shall be marked in accordance with the following:

CAUTION FLAMMABLE Use only in well-ventilated area or in a hood where no flames or other ignition sources are present.  
HARMFUL IF INHALED.

WARNING. Do not use this lubricant in food-processing or food-handling equipment on surfaces that may contact food. Do not allow the lubricant to contaminate foodstuffs.

The following additional marking is required on each pressurized can.

WARNING PRESSURIZED CONTAINER Do not store at a temperature above 49°C (120°F). Keep away from direct sunlight, radiators, stoves, hot water or other heat sources. Do not puncture this can nor place it in an incinerator.

5 4 Palletization When specified (see 6.2), filled cans, packed as specified in 5 2 1 1, 5 2.2 and 5 2 3, shall be palletized in accordance with Load Type I or MIL-STD-147. Each prepared load shall be bonded with primary and secondary strap in accordance with bonding means K or L. Pallet patterns shall be in accordance with the appendix thereto. Interlocking of loads shall be accomplished by reversing the pattern of each course. If the container is of a size which does not conform to any of the pallet patterns specified in MIL-STD-147, the pallet pattern used shall first be approved by the contracting officer.

## 6 NOTES

6 1 Intended use This air cured solid film lubricant is intended for use on steel, titanium or aluminum bearing surfaces where moderate wear life and corrosion protection are desired. It is useful where conventional lubricants are difficult to apply or retain or where other lubricants may be contaminated with dirt and dust. It is generally suitable for sliding motion applications such as in plain spherical bearings, flap tracks, hinges and cam surfaces, especially where it is

## MIL-L-23398D

not feasible to use the type of solid film lubricant which requires baking at an elevated temperature. This material, although intended for air dry application may be heat cured at temperatures up to 120°C (248°F). Use of manganese or zinc phosphate pretreatment on steel bearing surfaces will enhance the wear life and corrosion protection provided by this lubricant, which can be used to prevent scoring and seizure on initial start up of new or heavily loaded equipment. The use of this lubricant is not recommended on roller bearing elements or in conjunction with oils or greases unless field use indicates otherwise. This lubricant can be expected to provide corrosion protection for five years in indoor storage and approximately two years protection in outdoor storage when lubricant is applied over phosphated steel to a thickness of 0.0005 inch. Where maximum corrosion protection on steel is desired, the lubricant should be applied over phosphated steel to a thickness of 0.001 inch. The heavier coating can be expected to provide outdoor corrosion protection for approximately four years.

## 6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Types and sizes required (see 1.2).
- c. Quantities required.
- d. Degree of preservation and packing required (see 5.1 and 5.2).
- e. Any special marking (see 5.3).
- f. When palletization is required (see 5.4).
- g. Specify FAR clauses 52.223-3

6.2.2 Age limitation. The lubricant should not be ordered for use beyond 12 months from date of manufacture.

6.3 Qualification. With respect to products requiring qualification, awards will be made only for such products which are, at the time set for opening of bids, qualified for inclusion in Qualified Products List (QPL-23398) whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, 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 purchase orders for the products covered by this specification. The activity responsible for the Qualified Products List is Naval Air Systems Command, Attention: AIR-5304C, Department of the Navy, Washington, DC 20361; however, information pertaining to qualification of products and letter of authorization for submittal of sample may be obtained from the Director, Aircraft and Crews Systems Technology Directorate, Code 60612, Naval Air Development Center, Warminster, PA 18974.

6.4 Falex lubricant tester. Information pertaining to the Falex lubricant tester (see 3.4.4) can be obtained from the Faville-LeValley Corp., 2055 Comprehensive Drive, Aurora, IL 60505. The attention of the operator is called to the fact that repeatable and reproducible test results can only be obtained if the test instrument is in proper calibration.

MIL-L-23398D

6.5 International standardization agreements. Certain provisions of this specification (see 1.1) are the subject of international standardization agreement ASCC Air Standard 15/1, NATO STANAG NAT-STD-1135. When amendment, revision, or cancellation of this specification is proposed, which will effect or violate the international agreement concerned, the preparing activity should take appropriate reconciliation action through international standardization channels including departmental standardization offices, if required.

6.6 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.

Custodians:

Army - ME  
Navy - AS  
Air Force - 20

Preparing Activity:

Navy - AS  
(Project No. 9150-0771)

Review Interest:

Army - AR, AV, MI  
Defense Nuclear Agency - DS

User Interest.

Army - AT, SM

## MIL-L-23398D

TABLE I. Qualification inspection tests.

Characteristic	Paragraph	
	Requirement	Test
Presence of graphite or powdered metal	3.2	4.6 1
Film appearance	3.3	4.6 2
Film thickness	3.3	Table II
Film adhesion	3.4 1	Table II
Resistance to fluids	3.4 2	Table II
Thermal shock sensitivity	3 4 3	Table II
Endurance life	3.4 4	Table II
Load-carrying capacity	3.4 5	Table II
Aluminum corrosion resistance	3 4.6	Table II
Sulfurous acid - salt spray	3.4 7	Table II
Spray pattern and duration (Type II only)	3 4 8	4 6 3
Storage stability	3 4 9	4 6 4
Total Solids, Type I	3 5 1	4 6 5.1
Total Solids, Type II	3.5 2	4 6 5.2

## MIL-L-23398D

TABLE II. Methods of tests.

Test	Method	
	FED-STD-791	ASTM
Film thickness <u>1/</u>	3816	-
Film adhesion	-	D 2510, procedure A
Resistance to fluid <u>2/</u>	-	D 2510, Procedure C
Thermal shock sensitivity <u>3/</u>	-	D 2511
Endurance life <u>4/</u>	-	D 2625, procedure A
Load carrying capacity <u>4/</u>	-	D 2625, procedure B
Aluminum corrosion resistance <u>5/</u>	-	D 2649
Sulfurous acid - salt spray <u>6/</u>	5331	-

1/ The film thickness shall be determined after the panels have been air dried for 6 hours at  $25^{\circ} \pm 3^{\circ}\text{C}$  ( $77^{\circ} \pm 5^{\circ}\text{F}$ ).

2/ Test fluids shall be in accordance with Table III.

3/ Any condensation shall be removed with clean, dry compressed air. The dried panel shall then be subjected to the film adhesion test.

4/ The surface of the specimens shall be pretreated with phosphate in accordance with DOD-P-16232 or grit blasted (120 steel grit, 50-60 RMS) (See 6 4)

5/ The panels shall be exposed for at least 500 hours.

6/ The specimens coated with a solid film shall be sprayed for two hours and then dried for twenty-two hours at room temperature. The two-hour spray and the twenty-two hour drying period shall constitute one cycle. The coated panels shall be subjected to four cycles. Fresh sulfurous acid-salt fluid shall be used for each cycle.

## MIL-L-23398D

TABLE III. Test fluids.

Fluid	Specification
Hydraulic fluid, synthetic hydrocarbon base	MIL-H-83282
Lubricating oil, internal combustion engine, heavy duty	MIL-L-2104 grade 10
Turbine fuel	MIL-T-5624, grade JP-4
Lubricating oil, aircraft turbine engine, synthetic base	MIL-L-23699
Damping fluid, silicone base (dimethyl polysiloxane)	VV-D-1078
Trichloroethane	MIL-T-81533
Anti-icing fluid	MIL-A-8243
Cleaning compound, solvent for bore of small arms and automatic weapons	MIL-C-372
Reagent water	ASTM D 1193, type III

**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.

(Fold along this line)

(Fold along this line)

REPRODUCED AT GOVERNMENT EXPENSE

DEPARTMENT OF THE NAVY  
Commanding Officer  
Naval Air Engineering Center  
Engineering Specifications and Standards Department  
(ESSD), Code 93  
Lakehurst, NJ 08733



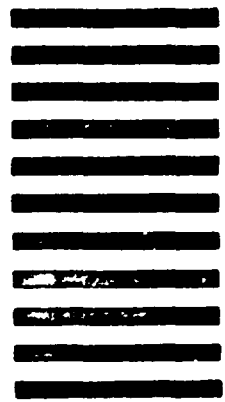
NO POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED STATES

OFFICIAL BUSINESS  
PENALTY FOR PRIVATE USE \$300

**BUSINESS REPLY MAIL**  
FIRST CLASS PERMIT NO. 12503 WASHINGTON, D.C.

POSTAGE WILL BE PAID BY THE DEPARTMENT OF THE NAVY

Commanding Officer  
Naval Air Engineering Center  
Engineering Specifications and Standards Dept  
(ESSD), Code 93  
Lakehurst, NJ 08733





## STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions Reverse Side)

1 DOCUMENT NUMBER MIL-L-23398D		2 DOCUMENT TITLE Lubricant, Solid Film, Air - Cured, Corrosion Inhibiting, NATO CODE Number S-749	
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	
5 PROBLEM AREAS		<input type="checkbox"/> MANUFACTURER	
		<input type="checkbox"/> OTHER (Specify) _____	
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)	

(TO DETACH THIS FORM, CUT ALONG THIS LINE)