

MIL-L-19701B
 8 November 1983
 SUPERSEDING
 MIL-L-19701A(AS)
 28 March 1969

MILITARY SPECIFICATION

LUBRICANT, ALL-WEATHER, SEMI-FLUID, FOR AIRCRAFT ORDNANCE, METRIC

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

1. SCOPE

1.1 Scope. This specification covers the requirements for a semi-fluid lubricant intended for the lubrication of aircraft machine guns and accessory equipment between -55°C and 70°C and under cold-sweat-cold cycling conditions.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

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

SPECIFICATIONS

FEDERAL

PPP-C-96 - Can, Metal, 28 Gage and Lighter.

MILITARY

MIL-P-5516 - Packing, Preformed, Petroleum Hydraulic Fluid Resistant, 160 Degree Fahrenheit.

STANDARDS

FEDERAL

FED-STD-313 - Material Safety Data Sheets Preparation and Submission of

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

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MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-290 - Packaging of Petroleum and Related Products.

AIR FORCE - NAVY AERONAUTICAL

- AN 6227 - Packing, O-Ring Hydraulic.

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

PUBLICATIONS

CODE OF FEDERAL REGULATIONS

- 49 CFR - Transportation - Hazardous Materials.

(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 contracting activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM D 471 - Rubber Property - Effect of Liquids.
- ASTM D 942 - Oxidation Stability of Lubricating Greases by the Oxygen Bomb Method.
- ASTM D 972 - Evaporation Loss of Lubricating Greases and Oils.

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- ANSI Z129.1 - American National Standard for the Precautionary Labeling of Hazardous Industrial Chemicals.

(Application for copies should be addressed to the American National Standards Institute, 1430 Broadway, New York, NY 10018.)

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

3.2 Composition. The lubricant shall be of an approved composition consisting of components of a grade and quality which have been demonstrated under firing tests to be suitable for the purpose intended and which will formulate a semi-fluid lubricant that conforms to all of the requirements of this specification (see 6.5).

3.3 Physical properties. Physical properties of the lubricant shall be in accordance with Table I.

3.4 Material safety data sheets. Material safety data sheets shall be prepared and submitted in accordance with FED-STD-313. Material safety data sheets shall also be forwarded as specified in 4.3.2. The grease shall have no adverse effect on the health of personnel when used for its intended purpose. Questions pertinent to this effect shall be referred by the contracting activity to the appropriate departmental medical service who will act as an advisor to the contracting agency (see 4.3.2 and 6.2.1.e).

QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

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

- a. Qualification inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).

4.3 Qualification inspection. Qualification inspection shall consist of a review of the test report (see 4.3.2) for approval, and by testing to determine that the qualification inspection sample (see 4.3.1) complies with all the requirements for the physical properties specified in Table I when tested in accordance with the inspection methods specified in Table II and 4.6.4 through 4.6.10.2.

4.3.1 Qualification inspection sample. The qualification inspection sample shall consist of 5 kilograms of lubricant. The sample shall be forwarded to the

Aircraft and Crew Systems Technology Directorate, Code 60612, Naval Air Development Center, Warminster, PA 18974. The sample shall be plainly identified by a securely attached durable tag or label marked with the following information:

Sample for qualification inspection.
 LUBRICANT, ALL WEATHER, SEMI-FLUID, FOR AIRCRAFT ORDNANCE, METRIC
 Name of manufacturer.
 Product code number.
 Batch number.
 Date of manufacture.
 Submitted by (name) (date) for qualification inspection in
 accordance with MIL-L-19701B under authorization of (reference
 authorizing letter) (see 6.3).

4.3.2 Test reports. Two copies of the manufacturer's test report, containing complete test data showing that the material submitted for qualification conforms to the requirements of this specification (see 4.3), shall be submitted with the qualification sample. Location and identity of the plant which produced the sample tested shall also be supplied. Material safety data sheets on toxicity (see 3.4) shall be prepared in accordance with FED-STD-313 and submitted to the qualifying laboratory (see 4.3.1).

4.3.3 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 of the lubricant shall consist of tests of samples from 4.4.2.2 in accordance with Table III and an examination of samples from 4.4.2.1 for conformance with 4.6.2. 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 information. A lot shall consist of all the lubricant produced by one manufacturer, at one plant, from the same materials and under essentially the same conditions, provided the operation is continuous and does not exceed a 24 hour period. In the event the process is a batch operation, each batch shall constitute a lot (see 6.4).

4.4.2 Sampling.

4.4.2.1 For examination of filled containers. A random sample of filled containers, fully prepared for delivery, shall be selected from each lot of grease in accordance with MIL-STD-105, Inspection Level I with an Acceptable Quality Level (AQL) of 2.5 percent defective.

4.4.2.2 For tests. The sample for tests shall consist of 1.5 kilogram sample of lubricant taken at random from filled containers from each lot of lubricant. The lot shall be unacceptable if the sample fails to comply with any of the requirements for the tests specified in Table III.

4.5 Test conditions. Test conditions shall be in accordance with 4.6 and the physical values specified in Table I apply to the coverage of determinations made on the sample.

4.6 Methods of examinations and tests.

4.6.1 Composition. The composition of the lubricant shall be certified by the manufacturer at the time of delivery.

4.6.2 Examinations. Each of the filled containers, selected in accordance with 4.4.2.1, shall be examined for defects of the container and closure, for evidence of leakage and for unsatisfactory markings to determine conformance with 5.1, 5.1.1 and 5.1.2. Each sample container shall also be weighed to determine the amount of contents. If the number of defective containers exceeds the acceptance number of the sampling plan specified in 4.4.2.1, the lot shall be rejected.

4.6.3 Tests. Tests shall be performed in accordance with the applicable ASTM test methods listed in Table II and 4.6.4 through 4.6.10.2 to determine conformance with the requirements specified in 3.3.

4.6.4 Apparent viscosity. The apparent viscosity shall be measured with a Brookfield Model LVF or LVT viscometer under the following conditions. The immersed portion of the rotating spindle shall be a cylinder 31 mm long and 3.2 mm in diameter (number 4 spindle immersed to center of immersion groove). The lubricant shall be contained in a beaker or cylinder not less than 30 mm in diameter to a depth of not less than 45 mm. All measurements shall be made with the rotor guard removed from the instrument, and apparent viscosity shall be computed without the application of the correction factors normally applied when the instrument is used with a guard. Lubricant samples shall be stirred to ensure uniformity but shall not be worked (except as required for worked stability and after storage) (see Table I). The temperature of the lubricant shall be checked before measurements by immersing a thermocouple or thermometer in the lubricant to ensure that the temperature is at $25 \pm 0.5^\circ\text{C}$ or $-55 \pm 1^\circ\text{C}$. When measuring the apparent viscosity at -55°C , the sample shall be held undisturbed at -55°C , with the spindle immersed, for two hours before beginning measurements. The instrument shall be used with an extension shaft if necessary, so that the instrument proper remains outside the cold chamber. The spindle shall be rotated in the lubricant at 60 rpm for at least one minute, after which readings shall be made at 60, 30, 12 and 6 rpm followed immediately by a series of 6, 12, 30 and 60 rpm. The spindle shall be allowed to rotate at each speed until a constant reading is obtained. Pairs of readings at the same speed should not differ by more than 10 percent. The value of apparent viscosity reported shall be that computed from the average of the two readings at 12 rpm.

4.6.5 Worked stability. The apparent viscosity of a portion of the lubricant sample shall be determined at $25 \pm 0.5^\circ\text{C}$ in accordance with 4.6.4. This portion shall then be worked an amount equivalent to ten passes through a 100-mesh screen in the Naval Research Laboratory (NRL) microworker (see 6.6). The apparent viscos-

ity of the worked lubricant shall be determined, again at $25 \pm 0.5^\circ\text{C}$ in accordance with 4.6.4, and the change in apparent viscosity calculated.

4.6.6 Storage stability.

4.6.6.1 After 7 days (168 hours). A well mixed sample of the lubricant shall be placed in an oil sample bottle or other glass container 30 to 50 mm in diameter to a depth of 100 ± 3 mm. No lubricant shall be on the walls of the container above the 100 ± 3.0 mm level. The sample shall be held at $50 \pm 1^\circ\text{C}$ for 168 hours and then examined for the presence of a separated oil layer (see Table I).

4.6.6.2 After one year. The sample of the lubricant shall be stored at $25 \pm 2^\circ\text{C}$, for a period of one year and then examined for evidence of oil separation. Sufficient sample shall be utilized so that the lubricant can be tested after the storage period for compliance with the worked stability and evaporation requirements (see Table I).

4.6.7 Rust prevention. Steel panels, SAE 1010 or 1020, 76 mm x 152 mm x 0.8 mm, shall be prepared as follows: (a) remove obvious contamination, rust, preservatives, etc., (b) wash with hot water and detergent, (c) rinse thoroughly with hot water, (d) rinse with acetone, (e) polish with clean, grade 1 emery paper, (f) rinse with hot tap water followed by distilled water, and (g) allow to dry. The lubricant shall immediately be applied with a glass rod, worked into the surface, and the excess struck off with the rod spaced 0.127 mm above the surface (two layers of cellophane tape) to leave an even film of the lubricant of approximately this thickness. The panel shall be placed with one end elevated so that the panel is inclined 15 degrees from the horizontal. A glass buret tip or other small glass tube shall be mounted vertically above the panel with the end of the tube 0.8 to 1.6 mm above the lubricant film. The tube shall be located equidistant from the sides of the panel and 25 to 50 mm from the upper end. A one percent solution of pure sodium chloride in distilled water shall be allowed to run from the tube onto the lubricant film at 3 ± 0.2 ml/minute. Constant flow rate can be achieved by siphoning the solution from a constant-level reservoir. After 100 ml of the solution have passed over the panel, it shall be examined for evidence of rusting. Four such tests shall be made on the lubricant sample.

4.6.8 Workmanship. A smooth steel panel, 51 by 102 mm, shall be dipped in the vertical position into the recently agitated lubricant. This panel is then removed with a smooth vertical motion and examined for lumps, inhomogeneities, and foreign matter.

4.6.9 Emulsification resistance. Place 5 ± 0.1 ml of the lubricant in a 50-ml graduated cylinder, having an internal height of 16 to 20 cm, and a ground-glass stopper. To this shall be added 25 ± 0.2 ml of heptane at least 96 percent pure, and the lubricant mixed with the heptane by shaking. Then 20 ± 0.2 ml of distilled water shall be added, and the cylinder shall be shaken vigorously by hand for 30 seconds. The mixture shall then be allowed to settle undisturbed at room temperature for 30 minutes \pm 30 seconds. The lubricant shall then be examined for conformity to Table I.

4.6.10 Machine gun performance test. The lubricant must provide acceptable performance as the sole lubricant on the entire MK 12, 20-mm machine gun and on the pneumatically operated MK 7 ammunition feeder. The lubricant performance shall be determined with two basic machine gun assemblies. The guns and feeders shall be completely disassembled, and all elastomeric seals shall be removed and discarded. The gun and feeder components shall be cleaned of all traces of lubricant by washing in a volatile solvent such as Stoddard solvent, Varsol, or unleaded gasoline. No chlorinated solvents shall be used. After all solvent has been removed, all surfaces of the gun and feeder components shall be liberally coated with the lubricant, applied with soft-bristled brush or by wiping it on with a saturated lint-free cloth. All elastomeric seals shall be installed after the surfaces have been covered with lubricant. These seals must conform to MIL-P-5516 and shall be new and free from flash and blemishes. The gun and feeder shall then be reassembled and test fired at normal ambient temperature. This firing shall consist of three 100-round bursts with the gun permitted to cool between bursts. The rate of fire of the last burst shall at least equal the acceptance rate for the MK 12 gun. The guns and feeders shall then be disassembled, cleaned, and relubricated; and new elastomeric seals shall be installed during reassembly.

4.6.10.1 The ammunition to be used (MK105TP) shall be lubricated with the same lubricant used on the guns. Lubricated dummy rounds shall be inserted in the chambers and the bolts closed. The guns, feeders, and ammunition shall then be chilled at -55°C for 90 minutes, exposed to 60 ± 3 percent relative humidity and 16°C temperature for 90 minutes, and then chilled at -55°C temperature for 90 minutes, after which each gun shall be charged and a 50-round burst shall be fired. Failure of either gun to charge, feed, or fire during three consecutive cold-sweat-cold cycles shall be cause for disqualification of the lubricant. No cleaning or relubrication shall be done during the three cold-sweat-cold cycles. The rate of fire shall not drop more than 150 rounds/minute below the average rate of fire established at normal ambient temperatures on the same gun. To fire the gun, it shall be charged solely by the pneumatic system; no manual assistance to the charger or feeder shall be permitted. Upon each removal from the sweating cabinet, the guns shall be allowed to drain briefly with the muzzles elevated. During overnight interruptions, the guns, feeders, and ammunition for the next bursts shall be kept at -55°C .

4.6.10.2 The mechanical failure of any gun or feeder part shall not be cause for repetition of the test, provided 25 rounds have been fired at an acceptable rate. The gun or feeder may be disassembled and replacement parts installed, with only the replacement parts receiving lubricant. Only one such disassembly shall be permitted during the required three cold-sweat-cold cycles; the need for further disassembly shall cause the test to be discontinued and a new test started. The facility conducting the test shall provide satisfactory moisture and oil-free air through air lines delivering satisfactory volume and pressure.

5. PACKAGING

5.1 Packaging and packing. The lubricant shall be packaged and packed in accordance with MIL-STD-290. The type and size of the containers and the level of packaging and packing shall be as specified by the acquiring activity (see 6.2.1). Unless otherwise specified, the lubricant shall be furnished in cans conforming to PPP-C-96, Type V, Class 2.

5.1.1 Marking. All unit, intermediate and shipping containers shall be marked in accordance with MIL-STD-290, Title 49 of the Code of Federal Regulations and the special markings specified in 5.1.2. All unit and intermediate packs of toxic and hazardous chemicals and materials shall also be labeled in accordance with the applicable laws, statutes, regulations or ordinances, including Federal, State and Municipal requirements. In addition, unit and intermediate containers, including unit containers that serve as shipping containers, such as pails and drums, shall be marked with the applicable precautionary information detailed in ANSI Z129.1.

5.1.2 Special marking. The following special marking shall appear on each container of lubricant:

FOR USE IN LUBRICATION OF AMMUNITION AND
GUNS ONLY. SHAKE WELL BEFORE USING.
CAUTION: CONTAINS A SILICONE COMPONENT
WHICH CAN IRRITATE THE EYES.

6. NOTES

6.1 Intended use. The synthetic lubricant covered by this specification is intended for use on the entire assembly of aircraft machine guns, associated mechanisms, and other weapons or equipment to ensure their functioning at low temperatures and under icing conditions. It is required to be compatible with oil-resistant rubber covered by MIL-P-5516. This lubricant contains silicone component which can cause irritation of the eyes.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number and date of this specification.
- b. Quantity desired.
- c. Size and type of container for lubricant (see 5.1).
- d. Selection of applicable levels of packaging and packing; marking; and other options, choices and alternatives indicated in MIL-STD-290 (see 5.1, 5.1.1 and 5.1.2).
- e. Specify DAR Clauses 7-104.98 and 1-323.2.

6.3 Qualification. With respect to products requiring qualification, awards may be made only for products which are, at the time set for opening of bids, qualified for inclusion in Qualified Products List (QPL-19701) 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 Commander, Naval Air Systems Command,

Attn: AIR-5304C1, Washington, DC 20361; however, information pertaining to qualification of products and letter or authorization for submittal of sample may be obtained from the Aircraft and Crew Systems Technology Directorate, Code 60612, Naval Air Development Center, Warminster, PA 18974.

6.3.1 Qualification information. It is understood that the lubricant furnished under this specification subsequent to final approval should be of the same composition and shall be equal to products upon which approval was originally granted. In the event that the lubricant furnished under contract is found to deviate from the composition of the approved product, or that the product fails to perform satisfactorily, approval of such products will be subjected to immediate withdrawal from the Qualified Products List.

6.4 Batch. A batch is defined as that quantity of material which has been manufactured by some unit chemical process and subjected to some physical mixing operation intended to make the final product substantially uniform.

6.5 Lubricant formulation. A lubricant which has been found to comply with all the requirements of this specification has the formulation shown in Table IV.

6.6 Laboratory microworker. The NRL microworker is described in an article by G. M. Hain, ASTM Bulletin 147, p. 86 (August 1947) and can be fabricated in accordance with this document.

6.7 Evaporation. The upper and lower limits for evaporation during the first twenty hours help to characterize the lubricant as a suitable blend of more or less volatile components. Typical results with the control formula product were 15 to 20 percent evaporated in 20 hours (see Table I).

6.8 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 9150-0618)

Review activities:
 DLA - PS

TABLE I. Physical properties.

Characteristics	Limits
Apparent viscosity, Pa.s: <u>1/</u> At $25^{\circ} \pm 0.5^{\circ}\text{C}$ At $-55^{\circ} \pm 1^{\circ}\text{C}$, maximum Maximum difference between -55°C and 25°C apparent viscosities	16 - 30 40 20
Worked stability, at $25^{\circ} \pm 0.5^{\circ}\text{C}$	Not less than 90 percent of original apparent viscosity
Evaporation, percent, weight loss, at $100^{\circ} \pm 0.5^{\circ}\text{C}$: In 20 hours In 100 hours, maximum	12 - 24 50
Storage stability: At $50^{\circ} \pm 1^{\circ}\text{C}$ for 168 hours At $25^{\circ} \pm 2^{\circ}\text{C}$ for one year: Appearance	No gross separation of oil and soap phases <u>2/</u> No gross separation of oil and soap phases
Worked stability, at $25^{\circ} \pm 0.5^{\circ}\text{C}$	Not less than 90 percent of original apparent viscosity
Evaporation, percent, weight loss, at $100^{\circ} \pm 0.5^{\circ}\text{C}$, in 20 hours	12 - 24
Oxidation stability, pressure drop, in 100 hours, kPa, maximum	35.0
Rust prevention	At least 3 out of the 4 exposed panels shall be free of any trace of rust
Rubber compatibility, change in weight, percent, in 72 hours, at 70°C	Maximum difference of 3 percent in MIL-P-5516 O-rings between lubricant and Table IV lubricant formulation results.

TABLE I. Physical properties. - continued

Characteristics	Limits
Workmanship	Shall form a translucent coating without any evidence of lumps or nonhomogeneous structure
Emulsification resistance	A continuous layer of at least 5 ml of water shall have separated from the emulsion
Machine gun performance	Shall permit satisfactory performance of a MK 12, 20-mm machine gun equipped with a MK 7 pneumatic feeder

- 1/ The lubricant shall be tested as specified on an as received sample and on a sample after 168 hours of storage at $50^{\circ} \pm 1^{\circ}\text{C}$.
- 2/ The accumulation of a thin film (less than 1 mm) of oil at the upper surface of the material or at the bottom of the sample bottle shall not be cause for rejection.

TABLE II. Applicable ASTM test methods.

Test	Method
Evaporation <u>1/</u>	D 972
Oxidation stability	D 942
Rubber compatibility <u>2/</u>	D 471

- 1/ The weight of the sample taken for the test shall be 1.00 g evenly distributed over the bottom of the test cell.
- 2/ The change in weight shall be determined by the general procedure of Section 8 of ASTM D 471 with the following specific provisions:
- a. The test pieces shall be rubber O-rings of approximately 13 mm external diameter, and having a cross-sectional diameter of approximately 1.7 mm. (An example of an O-ring meeting the requirements is that specified in AN 6227B-7, referred to in MIL-P-5516.) They shall be fabricated from rubber meeting the requirements of MIL-P-5516.
 - b. The test temperature shall be 70°C .

TABLE II. Applicable ASTM test methods. - Continued

- c. The change in weight of the test specimens shall be determined after 72 hours of contact with the lubricant.
- d. The weight gain produced by the lubricant under examination shall be compared with that produced in O-rings of the same lot by a reference fluid containing 65 weight-percent of a silicone fluid corresponding to component d and 35 weight-percent of component b of Table IV (see 6.5).

TABLE III. Quality conformance tests.

Inspection	Paragraph	
	Requirement	Test method
Apparent viscosity	3.3	4.6.4
Worked stability	3.3	4.6.5
Evaporation	3.3	4.6.3 (Table II)
Storage stability (after 7 days only)	3.3	4.6.6.1
Oxidation stability	3.3	4.6.3 (Table II)
Rust prevention	3.3	4.6.7
Rubber compatibility	3.3	4.6.3 (Table II)
Workmanship	3.3	4.6.8
Emulsification resistance	3.3	4.6.9
Examination of filled containers	5.1, 5.1.1 and 5.1.2	4.6.2

TABLE IV. Lubricant formulation.

Component	Weight-percent
a. Isodecyl pelargonate, lubricant grade <u>1/</u>	28.6 ± 0.5
b. Bis (2-ethylhexyl) sebacate, lubricant grade <u>2/</u>	9.0 ± 0.5
c. Dimethyl silicone fluid, 7.5 cs <u>3/</u>	39.2 ± 1.0
d. Slightly phenylated silicone fluid, 50 cs <u>4/</u>	14.2 ± 0.5
e. Phenylstearic acid	1.0 ± 0.05
f. Basic barium dinonylnaphthalene sulfonate (50 percent in volatile solvent) <u>5/</u>	2.0 ± 0.1
g. Oxidation inhibitor <u>6/</u>	0.4 ± 0.05
h. Lithium stearate <u>7/</u>	5.6 ± 1.5

- 1/ Equivalent to that supplied by Emery Industry as Emolein 2911.
- 2/ Equivalent to that supplied by Hatco Chemical Corp. as Hatcol 3110.
- 3/ Equivalent to that supplied by Dow Corning Corporation as DC-200 (7.5 cs may be obtained by blending equal portions of 5 cs and 10 cs fluids).
- 4/ Equivalent to that supplied by Dow Corning Corporation as DC-510, 50 cs.
- 5/ Equivalent to that supplied by R. T. Vanderbilt Co., Inc.
- 6/ 4-tert-butyl-2-phenylphenol, phenyl- α -naphthylamine, and 2, 6-di-tert-butyl-4-methylphenol have been found satisfactory.
- 7/ The use of a very pure grade of lithium stearate is essential to attain the required performance by the finished lubricant. The following procedure may be used to determine the suitability of the lithium stearate for this use. An infusion of the lithium stearate shall be prepared by briefly boiling 0.75 g of the lithium stearate in 25 ml distilled water and filtering through fine filter paper. Care shall be taken to exclude detergents and other surface-active materials. The infusion shall not be diluted or allowed to evaporate appreciably. The surface tension of the infusion shall then be measured by the ring method. ASTM D 971 test method shall be followed in regard to the apparatus, the preparation of the apparatus, and the calibration of the apparatus. The procedure used is that described in this test method for the determination of the surface tension of water (paragraphs 7(a) and (b)). That portion of the procedure dealing with oil-water interfacial tension is not used. The surface tension of the infusion should be no less than 380 micro-Newtons/meter.

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

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

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



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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER MIL-L-19701B	2. DOCUMENT TITLE Lubricant, All-Weather, Semi-Fluid, For Aircraft Ordnance, Metric
3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION (Mark one) <input type="checkbox"/> VENDOR <input type="checkbox"/> USER <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> OTHER (Specify): _____
b. ADDRESS (Street, City, State, ZIP Code)	
5. PROBLEM AREAS a. Paragraph Number and Wording:	
b. Recommended Wording:	
c. Reason/Rationale for Recommendation:	
6. REMARKS	
7a. NAME OF SUBMITTER (Last, First, MI) - Optional	b. WORK TELEPHONE NUMBER (Include Area Code) - Optional
c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional	8. DATE OF SUBMISSION (YYMMDD)