VV-L-800C
May 11, 1983
SUPERSEDING
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FEDERAL SPECIFICATION

LUBRICATING OIL, GENERAL PURPOSE, PRESERVATIVE

(WATER-DISPLACING, LOW TEMPERATURE)

This specification was approved by the Assistant Administrator, Office of Federal Supply and Services, General Services Administration, for the use of all Federal agencies.

1. SCOPE

1.1 Scope. This specification covers one type and grade of water-displacing, preservative lubricating oil for general purpose applications at low temperatures. The oil can be applied by dipping, brushing, or by spraying from gas-pressurized cans. The oil is identified by Military symbol PL-S and NATO Code Number O-190.

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:

Federal specifications:

TT-N-95 - Naphtha, Aliphatic.

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

Federal Standard:

Fed. Test Method Std. No. 791 - Lubricants, Liquid Fuels and Related Products; Methods of Testing.

(Activities outside the Federal Government may obtain copies of Federal specifications, standards, and commercial item descriptions, as outlined under General Information in the Index of Federal Specifications, Standards, and Commercial Item Descriptions. The Index, which includes cumulative bimonthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification, other Federal specifications, and commercial item descriptions required by activities outside the Federal Government for bidding purposes are available without charge from General Services Administration Business Service Centers in Boston, MA; New York, NY, Philadelphia, PA; Washington, DC; Atlanta, GA, Chicago, IL; Kansas City, MO; Fort Worth, TX; Houston, TX; Denver, CO; San Francisco, CA, Los Angeles, CA; and Seattle, WA.

(Federal Government activities may obtain copies of Federal standardization documents and the Index of Federal Specifications, Standards, and Commercial Item Description from established distribution points in their agencies.)

Military Standards:

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

(Copies of Military specifications and standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

American Society for Testing and Materials (ASTM) Standards:

D 91	- Precipitation Number of Lubricating Oils
D 92	- Flash and Fire Points by Cleveland Open Cup
D 97	- Pour Point of Petroleum Oils
D 130	- Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test
D 270	- Sampling Petroleum and Petroleum Products
D 445	- Kinematic Viscosity of Transparent and Opaque Liquids (and the calculation of Dynamic Viscosities)
D 972	- Evaporation Loss of Lubricating Greases and Oils
D 974	- Neutralization Number by Color-Indicator Titration
D 1500	- ASTM Color of Petroleum Products (ASTM Color Scale)
D 2266	- Wear Preventive Characteristics of Lubricating Grease (Four-Ball Method)

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

(Technical society specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies).

3. REQUIREMENTS

3.1 Qualification. Lubricating oils 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 4.5.1 and 6.3).

3.2 Material. The lubricating oil shall consist of a petroleum fraction with additives, as necessary.

3.3 Physical and chemical requirements. The lubricating oil shall conform to the requirements specified in table I and in 3.4 through 3.16.

TABLE I. Physical and chemical requirements (see 4.6, table II).

Properties	Values
ASTM color	No. 7.0, max.
Pour point: °C	-57 max.
(° F)	(-70 max.)
Viscosity kinematic, centistokes	
At 40° C (104° F)	11 min.
At -40° C (-40° F)	7,000 max.
At -54° C (-65.2° F)	60,000 max.
Flash point °C	135 min.
(°F)	(275 min.)
Precipitation number, milliliters	0.05 max.
Evaporation loss at 100° C (212° F), percent	25 max.

3.4 Corrosiveness and oxidation stability. After completion of the corrosiveness and oxidation stability test specified in 4.6 (table II), the requirements specified in 3.4.1 through 3.4.5 shall be met.

3.4.1 Weight change of metals. The changes in weight of the metal test specimens shall not exceed 0.2 milligram per square centimeter of surface area.

3.4.2 Surface characteristics of metals. The surfaces of the metal test specimens shall reveal no pitting nor etching when viewed under 20-diameter magnification.

3.4.3 Viscosity change. The kinematic viscosity of the oxidized oil at 40° C (104° F) shall not have increased more than 20 percent nor decreased more than 5 percent from the initial viscosity (of the unoxidized oil) at 40° C (104° F).

3.4.4 Neutralization number change. The neutralization number of the oxidized oil shall not be more than 0.20 higher than the initial neutralization number (of the unoxidized fluid).

3.4.5 Insoluble materials and gum. Visual examination of the oxidized oil shall reveal no insoluble materials or gum.

3.5. Copper corrosion. When the oil is tested as specified in 4.6 (table II), the discoloration of the copper strip shall be less than that represented by No. 3 of the ASTM Copper Strip Classifications.

3.6 Corrosion-protection (humidity cabinet). After testing the oil for 192 hours in a humidity cabinet as specified in 4.6 (table II), no more than a total of three corrosion dots, none of which exceeds one millimeter in diameter, shall be evident on the three test panels.

3.6.1 Corrosion-protection (humidity cabinet); for oil in gas-pressurized cans. In addition, when tested as specified in 4.6.1, lubricant sprayed from gas-pressurized cans shall be smooth and unbroken and shall show no evidence of gas entrapment before being placed in the humidity cabinet.

3.7 Water displacement and water stability. When tested as specified in 4.6 (table II), the oil, both in the as-received condition and after storage in contact with water, shall satisfactorily displace water, as evidenced by the absence of rust, mottling, or other abnormal surface stains on the test panels.

3.8 Cloud intensity at low temperature. When tested as specified in 4.6 (table II), the oil shall show no evidence of gelling, crystallization, solidification, or separation of insoluble material.

3.9 Corrosiveness (bimetallic couple). After 10 days exposure in the test specified in 4.6.2, a total of not more than three corrosion dots, none of which exceeds one millimeter in diameter, shall be evident on the steel discs.

3.10 Film characteristics. When the oil is tested as specified in 4.6.3, there shall be no evidence of gumminess, tackiness or hardening (see 6.4).

3.11 Removability. After completion of the test procedure specified in 4.6.4, there shall be no visual evidence of oil, residue, or stain on the test panels.

3.12 Wear. After performance of the test specified in 4.6.5, the average wear-scar diameter shall not exceed 1.0 millimeter. The average deviation from the mean value for separate tests shall not exceed 10 percent of the mean.

3.13 Machine-gun performance. The oil shall be tested as specified in 4.6.6. The criteria for satisfactory and unsatisfactory performance is as follows:

a. The performance of the oil shall be considered as satisfactory if:

(1) No stoppage attributable to the oil occurs in the first firing-test. (No further testing shall then be required.)
(2) No stoppage attributable to the oil occurs in the second of two firing-tests. (The second test is performed only when a stoppage occurs in the first test.)

b. The performance of the oil shall be considered as unsatisfactory if stoppages attributable to the oil occur in both of the firing-tests.

3.14 Leakage (from gas-pressurized cans only). When tested as specified in 4.6.7, gas-pressurized cans shall not leak nor become distorted.

3.15 Fill (of gas-pressurized cans only). Gas-pressurized cans shall have a minimum net weight of 16 ounces. The test for fill shall be performed as specified in 4.6.8.

3.16 Workmanship. The oil shall be homogeneous and free from foreign particles when inspected by transmitted light. The additive materials shall not separate.

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 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 that supplies and services conform to prescribed requirements.

4.2 Lot.

4.2.1 Bulk lot. An indefinite quantity of a homogeneous mixture of oil offered for acceptance in a single isolated container; or manufactured in a single plant run (not exceeding 24 hours) through the same processing equipment, with no change in the ingredient materials.

4.2.2 Packaged lot. An indefinite number of a homogeneous mixture of oil offered for acceptance in a single isolated container; or manufactured in a single plant run (not exceeding 24 hours) through the same processing equipment, with no change in the ingredient materials.

4.3 Sampling.

4.3.1 Sampling for the examination of filled containers. Take a random sample of filled containers from each lot in accordance with MIL-STD-105, at inspection level II and acceptable quality level (AQL) = 2.5 percent defective.

4.3.2 Sampling for tests. Take samples for tests in accordance with ASTM method D 270.

4.4 Inspection. Conduct inspection in accordance with method 9601 of Fed. Test Method Std. No. 791.

4.4.1 Examination of filled containers. Examine samples taken as specified in 4.3.1 for conformance with MIL-STD-290 with regard to fill, closure, sealing, and leakage. Reject any container having one or more defects or under the required fill. If the number of defective or underfilled containers exceeds the acceptance number for the appropriate sampling plan of MIL-STD-105, reject the lot represented by the sample.

4.5 Classification of tests. Tests are classified as follows:

a. Qualification tests.
b. Quality conformance tests.

4.5.1 Qualification tests. Qualification tests consist of tests for all of the requirements specified in section 3.

4.5.2 Quality conformance tests. Quality conformance tests consist of tests for all of the requirements specified in section 3 with the exception of machine-gun performance (see 3.13).

4.6 Test methods. Perform tests as specified in the applicable test methods in table II and in 4.6.1 through 4.6.8. Except as otherwise specified in 4.6.1, 4.6.7, and 4.6.8, perform tests on finished lubricant from unpressurized containers, regardless of the type of container in which the lubricant is to be supplied.

TABLE II. Test methods.

Test	Test Method No. Fed. Std. 791	Test Method No. ASTM
ASTM color		D 1500
Pour point		D 97
Viscosity, kinematic		D 445
Flash point		D 92
Precipitation number		D 91
Evaporation loss		D 972
Corrosiveness and oxidation stability	5308	
Neutralization number		D 974
Copper corrosion		D 130
Corrosion protection[1/] (humidity cabinet)	5329	

TABLE II. Test methods. (Continued).

Test	Test method No. Fed. Std. 791	Test method No. ASTM
Water displacement and water stability	3007	
Cloud intensity at low temperature 2/	202	

1/ See 4.6.1.
2/ Use a test period of 72 hours.

4.6.1 Corrosion-protection (humidity cabinet); for oil in gas-pressurized cans. Shake a gas-pressurized can of lubricating oil vigorously for 30 seconds. Set the cleaned panels at an angle of 15° from the vertical. Hold the pressurized can vertically at a distance of 10 to 12 inches from the panel. With the valve open, move the can to direct the spray from one edge of the panel to the other. Make sufficient passes to assure a continuous coating. After five minutes, examine the coating to determine if it is smooth and unbroken and if it shows evidence of gas entrapment. Drain the panels for 2 hours and subject them to the test specified in method 5329 of Fed. Test Method Std. No. 791.

4.6.2 Corrosiveness (bimetallic couple). Test the corrosiveness of the oil on a bimetallic couple in accordance with method 5322 of Fed. Test Method Std. No. 791, but use silicon-carbide or aluminum-oxide paper or cloth of 150 and 240 grit instead of the specified emery paper.

4.6.3 Film characteristics. Coat a glass panel or a microscope slide with a sample of the oil. Drain the panel for 24 hours at an angle of 45° with the horizontal and at a temperature of 25° ± 3° C (77° ± 5° F). Then drain the panel for 24 hours, in a horizontal position, at a temperature of 100° C (212° F). Examine the coating for gumminess, tackiness, or hardening.

4.6.4 Removability. Perform the removability test after completion of the corrosion-protection (humidity cabinet) test. Test the oil for removability by completely immersing the three oil-coated test panels used in the humidity-cabinet test in a beaker containing naphtha conforming to TT-N-95 and maintained, during the test period, at 25° ± 3° C (77° ± 5° F). Agitate the contents slightly for not more than one minute. Examine the panels for visual evidence of oil.

4.6.5 Wear. Evaluate the anti-wear properties of the oil in accordance with ASTM Method D 2266 with the following exceptions:

a. Use a sample of 10 ± 0.5 milliliters of oil.
b. Make duplicate runs.

4.6.6 Machine-gun performance. Dip a patch in a sample of the oil. Squeeze the patch to remove excess oil. Apply oil lightly to the working parts of a .50-caliber basic aircraft machine gun which has been cleaned of all foreign

matter and residue remaining from previous lubrication or preservation. Place the gun in a cold room maintained at -57° C (-70° F) for not less than three hours before the firing test. Following the cold-room exposure, fire the gun on the full automatic cycle with a belt of 25 rounds plus one round in the chamber. If a stoppage occurs which is attributable to the oil, a second test shall be conducted. If such a retest is necessary, wipe the gun clear of oil and re-oil it according to the instructions above.

4.6.7 Leakage (from gas-pressurized cans only). Immerse a pressurized can completely for five minutes in water maintained at 54° ± 2° C (129° ± 3° F). Observe the can for emission of bubbles or distortion during the test period.

4.6.8 Fill (of gas-pressurized cans only). Weigh a pressurized can. Spray oil for three-minute periods followed by one-minute pauses until the can is empty. Re-weigh the can and calculate its net weight.

4.7 Inspection of preparation for delivery.

4.7.1 Quality conformance inspection of pack.

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

4.7.1.2 Inspection lot. The inspection lot shall be as defined in 4.2, packed for shipment.

4.7.1.3 Sampling. Samples for examination of packaging shall be selected at random from each inspection lot in accordance with procedure prescribed in MIL-STD-105.

4.7.1.4 Examination. Samples selected in accordance with 4.7.1.3 shall be examined for the defects listed below. AQL shall be 4.0 percent defective.

101. Unit container not as specified in MIL-STD-290.
102. Intermediate container, when required, not as specified in MIL-STD-290.
103. Quantity and arrangement of unit containers packed in intermediate containers not as specified in MIL-STD-290.
104. Quantity and arrangement of intermediate containers packed in exterior containers not as specified in MIL-STD-290.
105. Exterior container not as specified in MIL-STD-290.
106. Metal cans with protruding closures not protected as specified in MIL-STD-290.
107. Marking not as specified in MIL-STD-290 and herein.

5. PREPARATION FOR DELIVERY

5.1 Unit, intermediate and exterior packing. Unit, intermediate and exterior packing shall be in accordance with MIL-STD-290, level B, level C or Commercial as specified (see 6.2). Type and size of unit container shall be as specified (see 6.2). Gas pressurized containers shall be 16 ounce capacity and shall conform to PPP-C-96, Type IX, Class 2.

5.2 Marking. Marking shall be as specified in MIL-STD-290 and herein.

5.2.1 Item description. Mark each unit, intermediate and exterior container as follows:

LUBRICATING OIL, GENERAL PURPOSE, PRESERVATIVE

5.2.2 Toxicity warning. Mark each unit and intermediate container as follows:

WARNING!

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

5.2.3 Warning for gas-pressurized cans. Mark each gas-pressurized can as follows:

WARNING!
CONTENTS UNDER PRESSURE

Do not store this can 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.

6. NOTES

6.1 Intended use. The lubricating oil, general purpose, preservative, is intended for lubrication and protection against corrosion of certain small arms and automatic weapons and whenever a general purpose, water-displacing, low-temperature lubricating oil is required. The oil loses its Newtonian properties at very low temperatures, as indicated by the viscosity requirements, so that its use at temperatures below -40° C (-40° F) is limited by a number of machine design factors and should be proved for any specific item application by test before adoption. The availability of this material in gas-pressurized containers will prove to be beneficial for use in areas difficult to preserve by existing procedures. This material is not to be used, concentrated, or diluted, in the interior of military vehicle/equipment fuel tanks/cells nor otherwise as a fuel to preserve/protect the interior of engines or engine fuel systems.

6.2 Ordering data. Acquisition documents should specify the following:

a. Title, number, and date of this specification.
b. Quantity (for bulk deliveries, specify the quantity in U.S. gallons; for deliveries in pressurized cans, specify the number of 16-ounce cans).
c. Type and size of container (see 5.1).
d. Degree of packaging required (see 5.1).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids qualified 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 U.S. Army Mobility Equipment Research and Development Command, ATTN: DRDME-GL, Fort Belvoir, VA 22060. Information pertaining to qualification of products may be obtained from that activity.

6.4 Definitions.

6.4.1 Film characteristics. A drying process progresses through three stages identified as gummy, tacky, and hard. These are defined as follows:

a. Gummy - First evidence of becoming viscous.
b. Tacky - Advanced stage of drying becoming sticky.
c. Hard - A completely dry-to-touch film.

6.5 International standardization. Certain provisions of this specification are the subject of international standardization agreements (NATO STANAGS 1135, and 2845). When amendment, revision, or cancellation of this specification is proposed which would affect or violate the international agreement concerned, the preparing activity will take appropriate reconciliation action through international standardization channels, including departmental standardization offices, if required.

6.6 Waste disposal instructions.

6.6.1 Recovery (RC). The very first step in disposal. Coordinate with Defense Property Disposal Office (DPDO) for turn-in for disposal of any excess items of supply. Defense Disposal Manual DOD 4160.21-M (with pertinent supplements/messages) describes the requirements for such turn-ins. Variations exist as to whether the DPDO accepts physical custody of the disposal turn-in. The potential for DPDO acceptance and disposal processing is enhanced by comprehensive identification. If the DPDO does not accept the item for disposal (accountability) or returns the item to the generator for disposal, the manufacturer/supplier should be contacted for chemical recovery before proceeding with ultimate disposal management procedures.

DISCLAIMER

THE RECOMMENDED DISPOSAL INSTRUCTION IS FORMULATED FOR USE BY ELEMENTS OF THE DEPART OF DEFENSE. THE UNITED STATES OF AMERICA IN NO MANNER WHATSOEVER EXPRESSLY OR IMPLIEDLY WARRENTS, STATES, OR INTENDS SAID INSTRUCTION TO HAVE ANY APPLICATION, USE, OR VIABILITY BY OR TO ANY PERSON OR PERSONS OUTSIDE THE DEPARTMENT OF DEFENSE NOR ANY PERSON OR PERSONS CONTRACTING WITH ANY INSTRUMENTABILITY OF THE UNITED STATES OF AMERICA AND DISCLAIMS ALL LIABILITY FOR SUCH USE. ANY PERSON UTILIZING THIS INSTRUCTION WHO IS NOT A MILITARY OR CIVILIAN EMPLOYEE OF THE UNITED STATES OF AMERICA SHOULD SEEK COMPETENT PROFESSIONAL ADVICE TO VERIFY AND ASSUME RESPONSIBILITY FOR THE SUITABILITY OF THIS INSTRUCTION TO THEIR PARTICULAR SITUATION REGARDLESS OF SIMILARITY TO A CORRESPONDING DEPARTMENT OF DEFENSE OR OTHER GOVERNMENT SITUATION.

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Army - ME
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Review Activities

Army - MD, MI, SM, AR, AT, AL
Navy - YD, SA
Air Force - 68
DLA - PS, GS

User Activities

Navy - OS, MC

International Interest (see 6.5)

CIVIL AGENCY COORDINATING ACTIVITIES:

DOT-ACO
GSA - FSS
NASA - JFK

PREPARING ACTIVITY:

Army - ME

Project 9150-A678

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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
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