

NOT MEASUREMENT SENSITIVE

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MILITARY SPECIFICATION
LUBRICATING OIL, INTERNAL COMBUSTION ENGINE,
ADMINISTRATIVE SERVICE

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

1. SCOPE

1.1 Scope. This specification covers engine oils suitable for lubrication of commercial-type vehicle reciprocating internal combustion engine of both spark-ignition and compression-ignition types used in administrative service (see 6.1).

1.2 Classification. The engine lubricants shall be of the following viscosity grades (see 6.2):

Viscosity grade

Grade 5W-30
 Grade 10W-30
 Grade 15W-40

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: USA Belvoir Research, Development, and Engineering Center, ATTN: STRBE-TSE, Fort Belvoir, VA 22060-5606 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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SPECIFICATIONS

MILITARY

- MIL-L-2104 - Lubricating Oil, Internal Combustion Engine, Tactical Service.
- MIL-L-21260 - Lubrication Oil, Internal Combustion Engine, Preservative and Break-In.
- MIL-L-46167 - Lubricating Oil, Internal Combustion Engine, Arctic.

STANDARDS

FEDERAL

- FED-STD-313 - Material Safety Data Sheets, Preparation and The Submission of.
- FED-STD-791 - Lubricants, Liquid Fuel and Related Products; Methods of Testing.

MILITARY

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

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.1.2 Other Government documents and publications. The following other Government documents and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DEPARTMENT OF LABOR (DOL)

- OSHA 29 CFR 1910.1200 - Hazard Communication Interpretation Regarding Lubricating Oils.

(Guideline CPL 2-2.38 may be obtained from OSHA Publications Office, Room S-4203, 200 Constitution Avenue, NW, Washington, DC 20210.)

2.2 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

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AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- D 92 - Flash and Fire Points by Cleveland Open Cup.
- D 94 - Saponification Number of Petroleum Products.
- D 97 - Pour Point of Petroleum Oils.
- D 129 - Sulfur in Petroleum Products (General Bomb Method).
- D 287 - API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method).
- D 445 - Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity).
- D 524 - Ramsbottom Carbon Residue of Petroleum Products.
- D 664 - Acid Number of Petroleum Products by Potentiometric Titration.
- D 808 - Chlorine in New and Used Petroleum Products (Bomb Method).
- D 874 - Sulfated Ash from Lubricating Oils and Additives.
- D 892 - Foaming Characteristics of Lubricating Oils.
- D 1091 - Phosphorus in Lubricating Oils and Additives.
- D 1317 - Chlorine in New and Used Lubricants (Sodium Alcoholate Method).
- D 1500 - ASTM Color of Petroleum Products (ASTM Color Scale).
- D 1552 - Sulfur in Petroleum Products (High-Temperature Method).
- D 2270 - Calculating Viscosity Index from Kinematic Viscosity at 40 and 100 °C, Standard Practice for.
- D 2622 - Sulfur in Petroleum Products (X-Ray Spectrographic Method).
- D 2887 - Boiling Range Distribution of Petroleum Fractions by Gas Chromatography.
- D 2896 - Base Number of Petroleum Products by Potentiometric Perchloric Acid Titration.
- D 3228 - Total Nitrogen in Lubricating Oils and Fuel Oils by Modified Kjeldahl Method.
- D 4047 - Phosphorus in Lubricating Oils and Additives by Quinoline Phosphomolybdate Method.
- D 4057 - Manual Sampling of Petroleum and Petroleum Products, Standard Practice for.
- D 4294 - Sulfur in Petroleum Products by Non-Dispersive X-Ray Fluorescence Spectrometry.
- D 4624 - Measuring Apparent Viscosity by Capillary Viscometer at High Temperature and High Shear Rates.
- D 4628 - Analysis of Barium, Calcium, Magnesium and Zinc in Unused Lubricating Oils by Atomic Absorption Spectrometry.
- D 4683 - Measuring Viscosity at High Temperature and High Shear Rate by Tapered Bearing Simulator.
- D 4684 - Determination of Yield Stress and Apparent Viscosity of Engine Oils at Low Temperature.
- D 4741 - Measuring Viscosity at High Temperature and High Shear Rate by Tapered Plug Viscometer
- D 4927 - Elemental Analysis of Lubricant and Additive Components - Barium, Calcium, Phosphorus, Sulfur, and Zinc by Wavelength Spectroscopy.

ASTM Special Technical Publication (STP) 315H.

- Engine Test Sequence IID.
- Engine Test Sequence IIIE.
- Engine Test Sequence VE.
- Engine Test Sequence VI

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ASTM Special Technical Publication (STP) 509A.
Caterpillar 1H2 Test Method.
Labeco L-38 Test Method.

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

DEUTSCHE INSTITUT für NORMUNG e.V. (DIN)

DIN 51581 - Determination of Evaporation Loss of Lubricating Oils (Noack Test).

(DIN test methods can be obtained from DIN, Burggratenstr 4-10, D-1000, Berlin 30, Germany)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

J300 - Engine Oil Viscosity Classification.
J183 - Engine Oil Performance and Engine Service Classification (Other than "Energy Conserving").

(Application for copies should be addressed to Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, (except for related associated detail specifications, specification sheets or MS standards), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Qualification. Engine 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 6.4).

3.1.1 Qualification period. Each viscosity grade of oil which satisfies all the requirements of this specification shall be qualified for a period not to exceed four years from the date of its original qualification. When the qualification period has expired, each product must be requalified if the contractor wishes to maintain the formulation as a qualified product and be eligible to bid on prospective procurements. If a product is submitted for requalification and there has been no change in the specification requirements, the qualifying activity may, at its discretion, waive complete retesting or require only partial retesting of the product to determine its continued acceptability.

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3.1.2 Formulation changes. Whenever there is a change in the source of the base stock, in the refining treatment or in the additives used in the formulation, requalification shall be required. When proposed changes are minor and may not be expected to significantly affect performance, the qualifying activity may, at its discretion, waive complete requalification or may require only partial requalification in order to determine the significance and acceptability of the proposed changes.

3.1.3 Lubricant tolerances. The engine lubricating oil supplied under contract shall be identical, within permissible tolerances assigned by the qualifying activity for the properties listed in 3.5, to the product receiving qualification. The values resulting after the application of tolerances shall not exceed the maximum nor fall below the minimum limits specified herein (see table I and 3.4.1 through 3.4.8).

3.1.4 Pour-point depressant. No changes shall be made in either type or concentration of the pour-point depressant after qualification testing and approval unless:

- a. The oil is retested for conformity to the pour-point, stable pour point, borderline pumping temperature and all viscosity requirements (see table I).
- b. The qualifying activity (see 6.4) is informed of the proposed change(s) and of the retesting..
- c. The qualifying activity approves the proposed change(s) in writing.

3.1.5 Material Safety Data Sheets. When applying for qualification, the manufacturer shall submit to the qualifying activity (see 6.4) Material Safety Data Sheets prepared in accordance with FED-STD-313 and 29 CFR 1910.1200. When FED-STD-313 is at variance with the CFR, 29 CFR 1910.1200 shall take precedence, modify and supplement FED-STD-313.

3.2 Materials. The engine lubricating oils shall be derived from petroleum fractions, synthetically prepared compounds or a combination of the two types of products. They may be virgin or re-refined stocks or combination thereof. The stocks shall be compounded with such functional additives (detergents, dispersants, oxidation inhibitors, corrosion inhibitors, etc.) as necessary to meet the specified requirements. The contractor shall certify that no carcinogenic or potentially carcinogenic constituents are present as defined under the Hazard Communication Standard (29 CFR 1910.1200). Certification to this effect shall be made available to the contracting officer or the contracting officer's designated representative.

3.2.1 Toxic products and formulations. The engine lubricating oil 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.

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3.3 Physical and chemical requirements.

3.3.1 Finished oil. The oils shall conform to the requirements specified in table I and 3.4.

TABLE I. Finished oil requirements.

Property	Grade 5W-30	Grade 10W-30	Grade 15W-40
Viscosity at 100 °C Kinematic, centistokes			
min.	9.3	9.3	12.5
max.	<12.5	<12.5	<16.3
Viscosity at 40 °C Kinematic, centistokes <u>1/</u>	X	X	X
Viscosity @ Temperature <u>2/</u> apparent, centipoise @ °C			
min.	3250@-30	3500@-25	3500@-20
max.	3500@-25	3500@-20	3500@-15
High temperature/high shear viscosity, min, mPa*s	2.9	2.9	3.7
Pumpability, 30,000 cP max. at °C	-30	-25	-20
Viscosity index	X	X	X
Pour point, °C, (max.)	-35	-30	-23
Stable pour point, °C, (max.) <u>3/</u>	-35	-30	-23
Flash point, °C, (min.)	200	205	215
Evaporative loss, % max <u>4/</u>	20	17	15
Phosphorus, mass %, (max.)	0.12	0.12	0.12
Other properties			
Gravity	X	X	X
Carbon residue	X	X	X
Sulfur	X	X	X
Sulfated ash	X	X	X
Total acid number	X	X	X
Total base number	X	X	X
Nitrogen	X	X	X
Metallic components	X	X	X

1/ Values shall be reported ("X" indicates report).

2/ Report measured apparent viscosity for the minimum and maximum temperature.

3/ After being cooled below its pour-point, the oil shall regain its homogeneity on standing at a temperature not more than 6 °C above the pour point.

4/ Limits when using ASTM D 2887 test method at 371 °C. Also report values for DIN 51581.

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3.3.2 Base stock. A 180 mL sample of each base stock component used in formulating the finished oil, accompanied by the following property data, shall be submitted to the qualifying activity (see 6.4) at the time of qualification. Annually thereafter a 180 mL production sample of each base stock component used in formulating the finished oil, accompanied by the aforementioned property data, shall be submitted to the qualifying activity.

Viscosity
 at 100 °C, centistokes
 at 40 °C, centistokes
 Viscosity index
 Gravity, °API
 Pour point, °C
 Carbon residue, mass %
 Sulfated ash, mass %
 Total acid number
 Saponification number
 Elemental content, mass %
 Nitrogen
 Chlorine
 Sulfur
 Color
 Boiling point distribution, °C
 @1%, 5%, 10%, 50% and 90% point

3.4 Performance requirements. The oils shall conform to the respective requirements specified in 3.4.1 through 3.4.8.

3.4.1 Foaming. All grades of oil shall demonstrate the following foaming characteristics when they are tested in accordance with 4.6, table II (ASTM D 892).

- a. Initial test at 24 ±0.5 °C. Not more than 10 mL of foam shall remain immediately following end of the 5-minute blowing period. No foam shall remain at the end of the 10-minute settling period.
- b. Intermediate test at 93.5 ±0.5 °C. Not more than 50 mL of foam shall remain immediately following the end of the 5-minute blowing period. No foam shall remain at the end of the 10-minute settling period.
- c. Final test at 24 ±0.5 °C. Not more than 10 mL of foam shall remain immediately following the end of the 5-minute blowing period. No foam shall remain at the end of the 10-minute settling period.

3.4.2 Stability and compatibility.

3.4.2.1 Stability. The oils shall show no evidence of separation or color change when they are tested in accordance with 4.6, table II (FED-STD-791, method 3470). A 180 mL sample of the finished lubricant used for this test shall be provided to the qualifying activity (see 6.4) at the time of qualification.

3.4.2.2 Compatibility. The oils shall be compatible with oils previously qualified under MIL-L-2104, MIL-L-46152, MIL-L-21260 and MIL-L-46167. The oils shall show no evidence of separation when they are tested against selected reference oils in accordance with 4.6, table II (FED-STD-791, method 3470).

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3.4.3 Moisture-corrosion characteristics. The oils shall prevent or minimize corrosion of ferrous-metal engine components in the presence of moisture inducted by low-temperature operating conditions. Satisfactory performance in this respect shall be demonstrated when the oils are tested and rated in accordance with 4.6, table II (Engine Test Sequence IID) and exhibit test results meeting the following criteria:

Average rust (min.)	8.5
Lifter sticking	None

3.4.4 Low-temperature deposits and wear. The oils shall minimize wear and the formation of undesirable deposits associated with intermittent, light-duty, low-temperature operating conditions. Satisfactory performance in this respect shall be demonstrated when the oils are tested and rated in accordance with 4.6, table II (Engine Test Sequence VE) and exhibit test results meeting the following criteria:

Average engine sludge (min.)	9.0
Average engine varnish (min.)	5.0
Average piston skirt varnish (min.)	6.5
Average rocker cover sludge (min.)	7.0
Oil ring clogging, % (max.)	15
Oil screen clogging, % (max.)	20
Compression ring sticking (hot stuck)	None
Cam wear, μm	
Average (max.)	127
Maximum	381

3.4.5 Oxidation and wear characteristics. The oils shall resist thermal and chemical oxidation and prevent or minimize wear, thickening and deposits associated with high-temperature operating conditions. Satisfactory performance in this respect shall be demonstrated when the oils are tested and rated in accordance with 4.6, table II (Engine Test Sequence IIIE) and exhibit test results meeting the following criteria:

40 °C viscosity increase @ 64 hrs., % (max.)	375
Average ratings @ 64 hrs.	
Piston varnish (min.)	8.9
Oil ring land deposits (min.)	3.5
Sludge (min.)	9.2
Ring sticking, compression and oil	None
Lifter sticking	None
Scuffing and wear @ 64 hrs.	
Cam or lifter scuffing	None
Cam plus lifter wear, μm	
Average (max.)	30
Maximum	64

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3.4.6 Ring-sticking, wear and accumulation of deposits. The oils shall prevent the sticking of piston rings and the clogging of oil channels, and shall minimize the wear of cylinders, rings and loaded engine components such as cam shaft lobes, cam followers, valve rocker arms, rocker arm shafts, and the oil pump and fuel injection pump drive gears. Satisfactory performance shall be demonstrated when the oils are tested and rated in accordance with 4.6, table II (Caterpillar 1H2) and exhibit test results meeting the following criteria:

Top groove filling, % (max.)	45
Total weighted deposit (max.)	140

3.4.7 Bearing corrosion and shear stability.

3.4.7.1 Bearing corrosion. The oils shall be non-corrosive to alloy bearings. Satisfactory performance in this respect shall be demonstrated when the oils are tested in accordance with 4.6, table II (Labeco L-38 test method) and exhibit test results meeting the following criteria:

Bearing weight loss, milligrams (max.)	40
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3.4.7.2 Shear stability. The lubricants shall demonstrate shear stability by remaining within the respective viscosity ranges at 100 °C when tested in accordance with 4.6.2.

3.4.8 Fuel efficiency of engine oils. The 5W-30 and 10W-30 oils shall reduce fuel consumption to the level specified herein without adverse side effects. Satisfactory performance in this respect shall be demonstrated when the oils are tested and rated in accordance with 4.6, table II (Engine Test Sequence VI) and exhibit test results meeting the following criteria:

Equivalent 5-car performance	2.7%
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3.5 Other requirements and tolerances for quality conformance testing. The following physical and chemical properties shall be tested in accordance with the appropriate methods listed in 4.6 to insure that purchased products are of the same compositions as the respective qualification samples and identify the products. No specific values or limits are assigned in qualification testing, except as specified in table II and 3.4.1 through 3.4.8, but test results shall be reported for all properties listed. Once the finished oil properties are known, the qualifying activity (see 6.4) shall establish specific values and tolerances for subsequent quality conformance testing of the finished lubricant for all of the following properties (see 6.3 and 6.4)

Viscosity	Foaming
Viscosity index	Phosphorus
Pour point	Sulfur
Flash point	Sulfated ash
Gravity, °API	Metallic components
Carbon residue	Nitrogen

3.6 Workmanship. The engine lubricating oil supplied under contract shall be free of suspended matter, grit or foreign matter as packaged and shall be uniform in appearance when examined visually through transmitted light.

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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.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirement in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.2 Lot.

4.2.1 Bulk lot. An indefinite quantity of a homogeneous mixture of one grade 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 55 gallon drums or smaller unit containers of identical size and type, offered for acceptance, and filled with a homogeneous mixture of one grade of oil from a single, isolated container; or filled with a homogeneous mixture of one grade of oil, 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.

4.3.2 Sampling for tests. Take samples from bulk or packaged lots for tests in accordance with ASTM D 4057.

4.4 Inspection. Perform inspection in accordance with FED-STD-791, method 9601. In addition to the inspection, the manufacturer shall provide certification of non-carcinogenicity as specified in 3.2 (ie: materials are not considered carcinogenic or potentially carcinogenic).

4.4.1 Examination of filled containers. Examine samples taken in accordance with 4.3.1 for compliance 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.

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4.5 Classification of test.

- a. Qualification tests (see 4.5.1).
- b. Quality conformance test (see 4.5.2).

4.5.1 Qualification tests. Qualification tests consist of tests for all of the requirements specified in section 3 and may be conducted in any plant or laboratory approved by the qualifying activity (see 6.4). Qualification tests shall be performed on each viscosity grade.

4.5.2 Quality conformance tests. Tests for quality conformance of individual lots shall consist of tests for all of the requirements in section 3, except for the following (see table II for corresponding test procedures):

- Requirements for base stock
- Stable pour point
- Stability and compatibility
- Ring-sticking, wear, and accumulation of deposits
- Low-temperature deposits and wear
- Oxidation and wear characteristics
- Moisture-corrosion characteristics
- Bearing corrosion and shear stability
- Evaporative loss
- High temperature/high shear

4.6 Test methods. Perform tests in accordance with table II and with 4.6.1 through 4.6.2, as applicable.

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TABLE II. Test methods.

Test	Test method			
	FED-STD-791	ASTM	SAE	DIN
Viscosity, kinematic		D 445		
Viscosity, apparent ^{1/}			J300	
High temperature/high shear viscosity		D 4683, D 4624, D 4741		
Viscosity index		D 2270		
Pour point		D 97		
Stable pour point	203			
Pumpability		D 4684		
Flash point		D 92		
Evaporative loss ^{2/}		D 2887		DIN 51581
Gravity, API		D 287		
Carbon residue		D 524		
Color		D 1500		
Total acid number		D 664		
Base number		D 2896		
Phosphorus		D 1091, D 4047		
Chlorine ^{3/}		D 808 or D 1317		
Sulfur ^{4/}		D 129, D 1552, D 2622, D 4294		
Nitrogen		D 3228		
Saponification number		D 94		
Sulfated residue		D 874		
Boiling range distribution		D 2887		
Metallic components ^{5/}	5601	D 4628, D 4927		
Foaming		D 892		
Stability and compatibility ^{6/}	3470			
Moisture-corrosion characteristics ^{7/}		Sequence IID		
Oxidation and wear characteristics ^{7/}		Sequence IIIE		
Low temperature deposits and wear ^{7/}		Sequence VE		
Fuel efficiency ^{7/}		Sequence VI		
Bearing corrosion and shear stability ^{8/}		Labeco L-38		
Ring-sticking, wear, and accumulation of deposits ^{8/}		Caterpillar 1H2		

1/ Obtain the apparent viscosity using the method of test set forth by appendix A of SAE J300.

2/ The ASTM D 2887 is the referee method. The DIN 51581 results shall also be reported.

3/ ASTM D 808 is the preferred method.

4/ ASTM D 1552 is the preferred method. ASTM D 4294 is only for use with base stocks.

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- 5/ Other spectrochemical analysis methods as approved by the qualifying activity (see 6.4) may be used as alternates.
- 6/ See 4.6.1 for clarifying instructions.
- 7/ In accordance with STP 315H
- 8/ In accordance with STP 509A, and for Labeco L-38 see 4.6.2.

4.6.1 Stability and compatibility. Determine the stability and compatibility of the oils by the procedures for "Homogeneity and Miscibility" given in FED-STD-791, method 3470, as explained in 4.6.1.1 and 4.6.1.2. The procedures in 4.6.1.1 and 4.6.1.2 shall be performed at the same time.

4.6.1.1 Stability. Determine the stability by subjecting an unmixed sample of oil to the prescribed cycle of temperature changes, then examine the sample for conformance to the requirements of 3.4.2.1. Record the test results on a copy of the "Homogeneity and Miscibility Test" form in the column marked "None".

4.6.1.2 Compatibility. Determine the compatibility of the oil with other oils previously qualified under MIL-L-2104, MIL-L-21260, MIL-L-46152 and MIL-L-46167 by subjecting separate mixtures of the oil with selected reference oils designated by the qualifying activity (see 6.4) to the prescribed cycle of temperature changes, then examine the mixtures for conformance to the requirements of 3.4.2.2. Record the test results on the same copy of the "Homogeneity and Miscibility Test" form (see 4.6.1.1) in the appropriate columns marked "1-30", "2-30", etc. Reference oils for conducting compatibility test are to be obtained from the SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

4.6.2 Shear stability. Determine the shear stability of the oils by the following method:

- a. Weigh 25 grams of used oil, obtained at 10 hours of testing in accordance with Labeco L-38 test method, into a 50-mL three-necked round bottom flask equipped with a thermometer, gas inlet tube, stirrer, and distillation side arm.
- b. Heat the sample at 120 ± 5 °C in a vacuum of 100 mm of mercury with a nitrogen sparge for one hour.
- c. Filter the stripped sample through a 0.5 micron filter pad.
- d. Determine the kinematic viscosity at 100 °C of the filtered sample using ASTM D 445. Check the resulting viscosity for conformance to the requirements of 3.4.7.2.

4.7 Inspection of packaging.

4.7.1 Quality conformance inspection 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 defined in 4.2 packed for shipment.

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

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

101. Unit container not as specified and not in accordance with the requirements of 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. Exterior container not as specified in MIL-STD-290.
105. Quantity and arrangement of intermediate containers packed in exterior containers not as specified in MIL-STD-290.
106. Marking not as specified in MIL-STD-290.
107. Net fill of container less than as specified.

4.8 Toxicological formulations. The contractor shall have the toxicological formulations and associated information available for review by the contracting activity to evaluate the safety of the material for proposed use.

5. PACKAGING

5.1 Unit, intermediate and exterior packing and marking. Unit, intermediate and exterior packing and marking of lubricating oil shall be in accordance with MIL-STD-290, level B or C as specified (see 6.2). Type and size of unit container shall be as specified (see 6.2 and 6.6).

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The lubricating oils covered by this specification meet SAE J183 service classifications SG and CC and are intended for the crankcase lubrication of commercial-type vehicles used for administrative (post, station, and camp) service typical of: (1) gasoline engines in passenger cars and light to medium duty trucks operating under manufacturers' warranties; and (2) light to moderate duty diesel engine service. The lubricating oils covered by this specification are intended for use, as defined by vehicle manufacturers, when ambient temperatures are above -35 °C.

6.2 Acquisition requirements. Acquisition documents shall specify the following:

- a. Title, number, and date of this specification.
- b. Date of issue of DoDISS applicable and exceptions thereto (see 2.1.1 and 2.2).
- c. Grade of oil required (see 1.2).
- d. Quantity of oil required.
- e. Type and size of containers required (see 5.1).
- f. Level of unit pack and exterior pack (see 5.1).

6.3 Other requirements and tolerances for quality conformance testing. Definite numerical values are not specified for certain of the physical and chemical properties listed in 3.5, and for which corresponding test methods are given in section 4. Values of some properties vary from one commercial brand of

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oil to another for the same grade. These values are influenced by the source of the base stock(s), the identities and quantities of additives, etc. Definite numerical values are not always functionally important except, for some properties, within specified maximum and minimum limits. It is not possible (or necessary) to assign restrictive values in the specification before the testing of qualification samples. During qualification, test values will be determined which are characteristic of a particular product and which can serve thereafter to identify the product. Using the results of qualification testing, the qualifying activity (see 6.4) can set values, including permissible tolerances, for future quality conformance testing.

6.4 Qualification. Lubricating oils are submitted for qualification with the intent to manufacture and supply the products to the Federal Government. 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 been actually so listed by that date. The attention of the contractors is called to this requirement. 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 US Army Belvoir, Research, Development and Engineering Center, ATTN: SIRBE-VF, Fort Belvoir, VA 22060-5606, and information pertaining to qualification of products may be obtained from that activity.

6.5 Material Safety Data Sheets. Contracting officers will identify those activities requiring copies of completed Material Safety Data Sheets prepared in accordance with 3.1.5. The pertinent government mailing addresses for submission of data are listed in appendix B of FED-STD-313. A copy of the data sheet must be forwarded with the application for qualification to the qualifying activity listed in 6.4.

6.6 Part or identifying number (PIN). The PIN to be used for engine oil acquired to this specification are created as follows. The military part number for grade 10W-30 lubricant to be furnished in 1-pint containers is shown in the following example:

M46152-1-10W30

"M" prefix and specification number _____

Dash number from table III indicating _____
the container size.

Viscosity grade _____

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TABLE III. Dash number designations for use in military part numbers.

Dash number	Container size
1	1-pint
2	1-quart
3	1-gallon
4	5-gallon pail
5	55-gallon drum
6	bulk

6.7 Subject term (key word) listing.

Administrative equipment
 Engine oil
 Gasoline engine
 Lubrication.

6.8 Changes from previous issue. Asterisks (or vertical lines) 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 - SH
 Air Force - 68

Preparing activity:

Army - ME

Project 9150-1037

Review activities:

Navy - SA, AS, MC
 Air Force - 11
 DLA - GS, PS

User activity:

Army - AT, AV, SM
 Navy - OS

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of 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.

RECOMMEND A CHANGE		1. DOCUMENT NUMBER MIL-L-46152E	2. DOCUMENT DATE (YYMMDD) 8 May 1990
3. DOCUMENT TITLE Lubricating Oil, Internal Combustion Engine, Administrative Service			
4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)			
5. REASON FOR RECOMMENDATION			
6. SUBMITTER			
a. NAME (Last, First, Middle Initial)		b. ORGANIZATION	
c. ADDRESS (Include Zip Code)		d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	e. DATE SUBMITTED (YYMMDD)
8. PREPARING ACTIVITY			
a. NAME		b. TELEPHONE (Include Area Code) (1) Commercial (703) 664-5717 (2) AUTOVON 354-5717	
c. ADDRESS (Include Zip Code) US Army Belvoir RDE Center ATTN: STRBE-TSE Ft. Belvoir, VA 22060-5606		IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	