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SUPERSEDING
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MILITARY SPECIFICATION

LUBRICATING OIL, STEAM-CYLINDER, MINERAL

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

1. SCOPE

1.1 Scope. This specification covers mineral oils intended for the lubrication of saturated and superheated systems and uniflow steam engine cylinders (see 6.1).

1.2 Classification. The lubricating oils shall be of the following grades, identified by the respective Military Symbols and NATO Code Numbers, as specified (see 6.2 and 6.3):

Military Symbol
5190
5230

NATO Code Number
0-258
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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.

AMSC N/A

FSC 9150

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2. APPLICABLE DOCUMENTS**2.1 Government documents.**

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

STANDARDS**FEDERAL**

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

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

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

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. Unless otherwise specified, the issues shall be those in effect on the date of 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 Publication Office, Room S-4203, 200 Constitution Avenue, NW, Washington, DC 20210.)

2.2 Other publications. The following document(s) form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DoDISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

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AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- D 91 - Precipitation Numbers of Lubricating Oils.
- D 92 - Flash and Fire Points by Cleveland Open Cup.
- D 94 - Saponification Number of Petroleum Products.
- D 95 - Water in Petroleum Products and Bituminous Materials by Distillation.
- D 97 - Pour Point of Petroleum Oils.
- D 129 - Sulfur in Petroleum Products (General Bomb Method).
- D 130 - Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test.
- D 445 - Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity).
- D 482 - Ash from Petroleum Products.
- D 524 - Ramsbottom Carbon Residue of Petroleum Products.
- D 974 - Neutralization Number by Color Indicator Titration.
- D 1552 - Sulfur in Petroleum Products (High Temperature Method).
- D 2270 - Calculating Viscosity Index from Kinematic Viscosity at 40 and 100 °C.
- D 2622 - Sulfur in Petroleum Products (X-Ray Spectrographic Method).
- D 4057 - Manual Sampling of Petroleum Products.
- D 4177 - Automatic Sampling of Petroleum and Petroleum Products.

(The test methods listed are included in Volumes 05.01, 05.02, and 05.03 of the Annual Book of ASTM Standards and are available individually. Applications for copies of all ASTM publications should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

(Nongovernment standards and other publications are normally available from the organizations which prepare or which 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 specification and the references cited herein, (except for associated detail specifications, specifications sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Material. The oils shall be refined mineral oils. No refined base stocks shall be used. The oils shall contain only the additives as specified in 3.2. The contractor shall certify that no carcinogenic or potentially carcinogenic constituents are present as defined under the Hazard Communication Standard (HSC) 29 CFR 1910.1200. Certification to this effect shall be made available to the contracting officer or the contracting officer's representative.

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3.2 Additives. Addition of a pour-point depressant or flow-improver is permissible, if necessary to meet the pour point requirement of this specification.

3.3 Physical and chemical requirements. Steam cylinder mineral lubricating oils shall conform to the requirements in table I.

TABLE I. Physical and chemical requirements.

Property	Value	
	MIL Symbol 5190	MIL Symbol 5230
Kinematic viscosity, cSt at 100 °C	38.9-47.7	47.8-52.1
Viscosity index, min	-	90
Pour point, °C, max	16	16
Flash point, °C, min	274	304
Neutrality, qualitative	Neutral	Neutral
Acid or base number, max	0.15	0.10
Copper strip corrosion at 100 °C	1 max	1 max
Water, %	None <u>1/</u>	None <u>1/</u>
Ash, % wt, max	0.05	0.05
Carbon residue, %, max	2.51	2.51
Nature of carbon residue	<u>2/</u>	<u>2/</u>
Total Sulfur, %, max	0.50	0.50
Precipitation number, max	0.05	0.05
Saponification number, max	0.5	0.5

1/ No moisture visible in distillation trap.

2/ Shall be loose and flaky.

3.4 Toxicity. The lubricating oils shall have no adverse effect on human health when used for their intended purposes. Questions on toxicity shall be referred by the procuring activity to the appropriate departmental medical service. Toxicity shall be determined in accordance with 4.8.

3.5 Material safety data sheets. The material safety data sheets shall be provided in accordance with the requirements of 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.

3.6 Workmanship. The oils shall be homogeneous products, free from visible water, foreign matter, undissolved additives and sediment in suspension.

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

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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 requirements 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.

4.1.2 Component and material inspection. The contractor is responsible for insuring that components and materials are manufactured, examined, and tested in accordance with referenced specifications and standards, as applicable.

4.2 Lot.

4.2.1 Bulk lot. An indefinite quantity of a homogeneous blend 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 blend of one grade of oil from a single, isolated container; or filled with a homogeneous blend 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 examination of filled containers. Take a random sample of filled containers from each packaged lot in accordance with MIL-STD-105 at inspection level II and acceptable quality level (AQL) shall be 1.0 percent defective.

4.3.2 Sampling for tests. Take samples for tests in accordance with ASTM, D 4057 or D 4177.

4.4 Inspection. Perform inspection in accordance with method 9601 of FED-STD-791.

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, leakage, packing, packaging, and marking requirements. Any container

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having one or more defects or under the required fill shall be cause for rejection. 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. Certification of non-carcinogenicity (i.e., materials are not carcinogenic or potentiallly carcinogenic) as specified.

4.5 Classification of tests. All tests are quality conformance tests.

4.6 Test methods. Perform testing in accordance with the applicable methods listed in table II. Samples tested in accordance with the methods specified in table II shall meet the requirements of table I. Any evidence of nonconformance to the applicable requirement shall constitute failure of the test and be cause for rejection.

TABLE II. Test methods.

Test	FTMS 791 Test Method No.	ASTM Test Method No.
Kinematic viscosity		D 445
Viscosity index		D 2270
Pour point		D 97
Flash point		D 92
Neutrality, qualitative	5101	
Acid or base number		D 974
Copper strip corrosion		D 130
Water		D 95
Ash		D 482
Carbon residue		D 524
Sulfur ^{1/}		D 1552, D 129, or D 2622
Precipitation number		D 91
Saponification number		D 94

^{1/} D 1552 is the preferred method but either D 129 or D 2622 may be used as an alternative. However, D 1552 is the referee method which shall be used to resolve disputes.

4.7 Report of analysis. The contractor shall provide copies of analysis reports, giving the results of these tests, including a statement of the type and concentration of the additive used in the oil.

4.8 Toxicity. Toxicity shall be determined in accordance with FED-STD-313.

4.9 Examination for material conformance. The product shall conform to the requirements in 3.1 as a result of meeting all physical and chemical requirements in table I.

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4.10 Examination of product. Samples selected shall be visually examined.

5. PACKAGING

5.1 Packing and marking. Mineral lubricating oil contained in the size and type container specified (see 6.2), shall be preservation-packaged, packed, and marked in accordance with MIL-STD-290. Packing shall be level A, B, or commercial as specified (see 6.2).

6. NOTES

6.1 Intended use.

6.1.1 Military symbol 5190 lubricating oil is intended for use in saturated and superheated steam systems.

6.1.2 Military symbol 5230 lubricating oil is essential for the lubrication of uniflow steam engine cylinders.

6.2 Ordering data.

- a. Title, number, and date of this specification.
- b. Date of issue of DoDISS applicable and exceptions thereto (see 2.1.1).
- c. Grade of oil required, identified by the military symbol (see 1.2).
- d. Type and size of container required (see 5.1).
- e. Level of preservation-packaging and packing required (see 5.1).
- f. Quantity of oil required. The unit of purchase shall be either the US gallon or the liter, both at 15.6 °C.

6.3 International standardization agreements. Certain provisions (see 1.2) of this specification are the subject of international standardization agreement, NATO STANAG 1135. When amendment, revision, or cancellation of this specification is proposed which would affect or isolate the international agreement concerned, the preparing activity will take appropriate reconciliation through international standardization channels, including departmental standardization offices, if required.

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6.4 Material safety data sheets. The contracting officer will identify those activities requiring copies of completed Material Safety Data Sheets prepared in accordance with 3.5. The pertinent Government mailing addresses for submission of data are listed in appendix B of FED-STD-313.

Custodians:

Army - ME
Navy - SH

Preparing activity:

Army - ME

Review activities:

Navy - AS, SA

Project 9150-A660

International interest:

NATO (see 6.3)

User activities:

Navy - MC, OS, YD

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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 revise any portion of the referenced document(s) or to amend contractual requirements.

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL (See Instructions - Reverse Side)	
1. DOCUMENT NUMBER MIL-L-53074	2. DOCUMENT TITLE Lubricating Oil, Steam-Cylinder, Mineral
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) _____
3b. ADDRESS (Street, City, State, ZIP Code)	
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7a. NAME OF SUBMITTER (Last, First, MI) - Optional	7b. WORK TELEPHONE NUMBER (Include Area Code) - Optional
8. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional	9. DATE OF SUBMISSION (YYMMDD)