

NOT MEASUREMENT SENSITIVE
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MIL-PRF-53074A  
14 September 1998  
SUPERSEDING  
MIL-L-53074  
4 August 1987

## PERFORMANCE 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 performance 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 are of the following grades identified by the respective Military Symbols and NATO Code Numbers, as specified (see 6.2 and 6.3):

Military Symbol	NATO Code Number
5190	0-258
5230	--

<p>Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-TR-E/BLUE, Warren, MI 48397-5000, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.</p>
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AMSC N/A

FSC 9150

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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## 2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirement documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 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).

## STANDARDS

## FEDERAL

FED-STD-791 - Lubricants, Liquid Fuels and Related Products; Methods of Testing, or Equivalent (See 4.3).

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Documents Order Desk, 700 Robins Avenue, Bldg 4D, Philadelphia, PA 19111-5094)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, 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.

(Copies of the Code of Federal Regulations (CFR) are available from the Superintendent of Documents, U.S. Government Printing Office, Washington DC 20402.)

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2.3 Non-Government publications. The following documents 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).

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D91	- Precipitation Numbers of Lubricating Oils DoD Adopted).
D92	- Standard Test Method for Flash and Fire Points by Cleveland Open Cup.
D94	- Standard Test Method for Saponification Number of Petroleum Products (DoD Adopted).
D95	- Water in Petroleum Products and Bituminous Materials by Distillation (DoD Adopted).
D97	- Pour Point of Petroleum Oils. (DoD Adopted).
D129	- Sulfur in Petroleum Products (General Bomb Method) (DoD Adopted).
D130	- Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test (DoD Adopted).
D445	- Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity) (DoD Adopted).
D482	- Ash from Petroleum Products (DoD Adopted).
D524	- Ramsbottom Carbon Residue of Petroleum Products (DoD Adopted).
D974	- Neutralization Number by Color Indicator Titration (DoD Adopted).
D1552	- Sulfur in Petroleum Products (High Temperature Method) (DoD Adopted).
D2270	- Calculating Viscosity Index from Kinematic Viscosity at 40 and 100°C (DoD Adopted).
D2622	- Sulfur in Petroleum Products (X-Ray Spectrographic Method) (DoD Adopted).
D4057	- Manual Sampling of Petroleum Products (DoD Adopted).
D4177	- Automatic Sampling of Petroleum and Petroleum Products (DoD Adopted).

(Application for copies should be addressed to the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

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2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, 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 Materials. Unless otherwise specified herein, the materials selection is the prerogative of the contractor as long as all articles submitted to the Government fully meet the requirements specified.

3.1.1 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.2 Operating requirements. Steam cylinder mineral lubricating oils shall conform to the requirements as specified in 3.2.1.

3.2.1 Finished oil properties. The values shall not exceed the maximum (max.) or fall below the minimum (min.) limits as specified in table I.

TABLE I. Finished oil properties.

Property	MIL Grade/Symbol	
	5190	5230
Kinematic Viscosity, Centistoke (cSt) @ 100 degrees Celsius (°C)	38.9 - 47.7	47.9 - 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 Corrosion @ 100 °C, max. <u>1</u> /	1	1
Water, %	None	None
Ash, % wt, max.	0.05	0.05
Ramsbottom Carbon Residue, %, max.	2.51	2.51
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.

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3.3 Support and ownership requirements. The oil shall meet the support and ownership requirements as specified in 3.3.1.

3.3.1 Hazardous materials. The oils shall not contain carcinogenic or potentially carcinogenic constituents as defined under the Hazard Communication Standard 29 CFR 1910.1200.

#### 4. VERIFICATION

4.1 Conformance inspections. Conformance inspections shall include tests for all requirements as specified in table II (see 6.4).

4.2 Sampling. Samples from bulk or packaged lots shall be taken for testing in accordance with ASTM D4057 or D4177, as appropriate.

TABLE II. Verification methods.

Title	Requirements	Verification
<b>Operating requirements</b>	3.2	4.3.2
Finished oil properties	3.2.1	4.3.2.1
<b>Support and ownership</b>	3.3	4.3.3
Hazardous materials	3.3.1	4.3.3.1

4.3 Verification methods. The types of verification methods included in this section are visual inspection, measurement, sample tests, full-scale demonstration tests, simulation, modeling, engineering evaluation, component properties analysis, and similarity to previously approved or previous qualified designs.

4.3.1 Verification alternatives. The manufacturer may propose alternative test methods, techniques, or equipment, including the application of statistical process control, tool control, or cost effective sampling procedures, to verify performance. See the contract for alternatives that replace verification required by this specification.

4.3.2 Operating requirements verification. Complete each test under 4.3.2.

4.3.2.1 Finished oil properties verification. Use the test methods as specified in table III to determine that finished oil properties are as specified.

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Table III. Finished oil property test methods.

Property	Test Method	
	FED-STD-791 or equivalent (see 4.3)	ASTM
Kinematic Viscosity, Centistoke (cSt) @ 100°C	5101	D445
Viscosity Index, min.		D2270
Pour Point, °C, max.		D97
Flash Point, °C, min.		D92
Neutrality, qualitative		
Acid or base number, max.		D974
Copper Corrosion @ 100 °C, max.		D130
Water, %		D95
Ash, % wt, max.		D482
Ramsbottom Carbon Residue, %,max.		D524
Total sulfur, % wt, max. <u>1/</u>		D1552, D129, or D2622
Precipitation number, max.		D91
Saponification number, max.		D94

1/ D1552 is the preferred method but either D129 or D2622 may be used as an alternative. However, D1552 is the referee method which shall be used to resolve disputes.

#### 4.3.3 Support and ownership requirements. Complete each test under 4.3.3.

4.3.3.1 Hazardous materials and compatibility tests. Use one or more of the methods outlined in 4.3 and 4.3.1 to verify the absence of hazardous materials or hazards to personnel.

### 5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

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## 6. NOTES

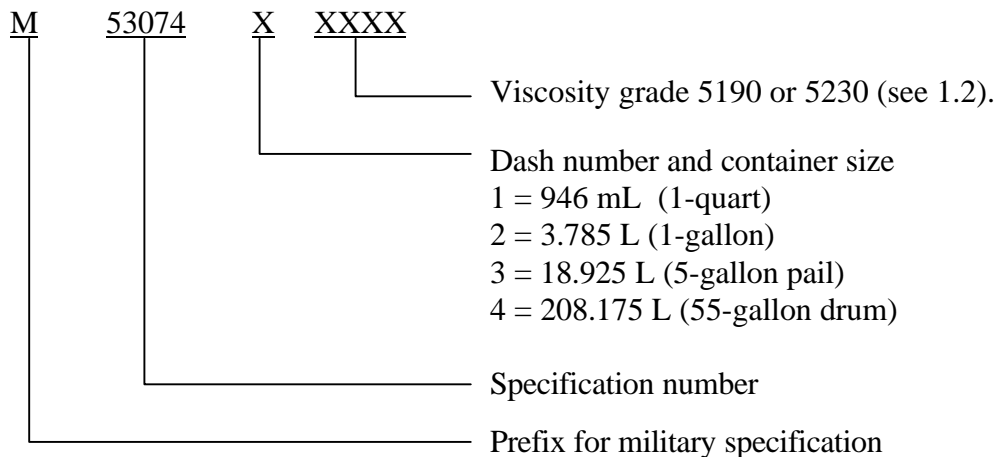
(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. Military symbol 5190 lubricating oil is intended for use in saturated and superheated steam systems. Military symbol 5230 lubricating oil is intended for and is essential for the lubrication of uniflow steam engine cylinders. Non-government standards that meet the requirements within this specification are not available and military symbol 5190 lubricating oil belongs to NATO standardization.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Grade of oil required, identified by the military symbol (see 1.2).
- c. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2.1 and 2.3).
- d. Packaging requirements, quantity and PIN (see 5.1 and 6.3).

6.3 Part or identifying number (PIN) configuration. The PIN to be used for oils acquired to this specification are created as follows:



6.4 Conformance testing. Affordable conformance inspection with confidence varies depending upon a number of procurement risk factors. Some of these factors include: Contractor past performance, government schedules and budget, product material and design maturity, manufacturing capital equipment and processes applied, the controlled uniformity of those processes, labor skill and training, and the uniformity of measuring processes and techniques. During the solicitation, contracting documents should indicate those tests desired from table II and their designated frequency based on a risk assessment for the procurement.

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6.5 Definitions.

6.5.1 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.

6.5.2 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.

6.6 Subject term (key word) listing.

Saturated steam engines  
Superheated steam engines  
Uniflow engines

6.7 International standardization agreement. Certain provisions of this specification are subject of international standardization agreement STANAG 1135. When amendment, revision, or cancellation of this specification is proposed which the international agreement concerned, the preparing activity will take appropriate reconciliation action through international standardization channels, including departmental standardization offices, to change the agreement or make other appropriate accommodations.

6.8 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

Custodians:  
Army - AT  
Navy - YD1

Preparing Activity:  
Army - AT

Review Activities:  
Navy - AS, MC, OS, SA

(Project 9150-A819)



# 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, 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.

### I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER  
MIL-PRF-53074A

2. DOCUMENT DATE (YYMMDD)  
980914

### 3. DOCUMENT TITLE

LUBRICATING OIL, STEAM-CYLINDER, MINERAL

### 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)*

7. DATE SUBMITTED  
(YYMMDD)

### 8. PREPARING ACTIVITY

a. NAME

b. TELEPHONE *(Include Area Code)*

(1) Commercial (810) 574-8745 (2) AUTOVON 786-8745

c. ADDRESS *(Include Zip Code)*

Commander  
U.S. Army Tank-automotive and Armaments Command  
ATTN: AMSTA-TR-E/BLUE  
Warren, MI 48397-5000

IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:  
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Telephone (703) 756-2340 AUTOVON 289-2340