METRIC

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PERFORMANCE SPECIFICATION

LUBRICATING OIL, GEAR, PETROLEUM BASE

(NATO O-153, O-155)

Comments, suggestions, or questions on this document should be addressed to HQ AFPET/PTPT, 2430 C Street, Bldg 70, Area B, Wright-Patterson AFB OH 45433-7632 or e-mailed to AFPET.AFTT@wpafb.af.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at https://assist.daps.dla.mil.

AMSC N/A FSC 9150

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

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

1. SCOPE

1.1 Scope. This specification covers two grades of petroleum-based lubricating oils for gears (see 6.1). This oil is identified by NATO Code Numbers O-153 and O-155 (see 1.2).

1.2 Classification. Oil covered by this specification shall be classified as one of the following two grades (see 6.2):

a. Grade L – Light; identified by military symbol OGL and NATO Code O-153 (see 6.4).

b. Grade M – Medium; identified by military symbol OGR and NATO Code O-155 (see 6.4).

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 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 requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

2.2 Non-government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract (see 6.2).

ASTM International

ASTM D91	Standard Test Method for Precipitation Number of Lubricating Oils (DoD Adopted)
ASTM D92	Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester (DoD Adopted)
ASTM D97	Standard Test Method for Pour Point of Petroleum Products (DoD Adopted)
ASTM D130	Standard Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test (DoD Adopted)
ASTM D445	Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity) (DoD Adopted)
ASTM D892	Standard Test Method for Foaming Characteristics of Lubricating Oils (DoD Adopted)
ASTM D974	Standard Test Method for Acid and Base Number by Color-Indicator Titration (DoD Adopted)
ASTM D1500	Standard Test Method for ASTM Color of Petroleum Products (ASTM Color Scale) (DoD Adopted)
ASTM D2270	Standard Practice for Calculating Viscosity Index from Kinematic Viscosity at 40 and 100°C (DoD Adopted)
ASTM D2783	Standard Test Method for Measurement of Extreme-Pressure Properties of Lubricating Fluids (Four-Ball Method)

(Copies of these documents are available online at http://www.astm.org or the ASTM International, 100 Barr Harbor Drive, West Conshohocken PA 19428-2959)

2.3 Order of precedence. Unless otherwise noted herein or in the contract, 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 Qualification. Any oil furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.3 and 6.4).

3.1.1 Requalification. Requalification will be required if there is a change in the base stock source, refining treatment or additives. A minor change in the fluid formulation may be made without requalification, but only after notification to, and approval by, the qualifying activity. The qualifying activity may, at its discretion, waive complete requalification or may require only partial requalification testing to determine the significance and acceptability of the proposed formulation change.

3.2 Materials. The oil shall consist of base stock oil mixed with a suitable load-carrying additive. The additive shall not be corrosive or cause excessive foaming, and shall be completely compatible with the base stock. The oil shall be clear and free of visible water, suspended matter, dirt, sediment or other impurities when observed at room temperature (25°C ±2°C). Recycled constituent materials shall not be used.

3.3 Properties. The physicochemical properties of the finished gear oil shall be as specified in Table I and 3.4.1

TABLE I. Physicochemical properties.

Property	**Requirements, grade L**	**Requirements, grade M**	**Units of measurement**	**Test method**
Viscosity	23-34	60-82	mm^2/s at 37.8°C	ASTM D445
Viscosity index	80	80	(minimum)	ASTM D2270
Flash point	137.8	154.5	°C (minimum)	ASTM D92
Pour point	- 40	- 28.9	°C (maximum)	ASTM D97
Load wear index	40	40	kg (minimum)	ASTM D2783
Precipitation number	0.1	0.1	mL (maximum)	ASTM D91
Acid number	1.0	1.0	mg KOH/g (maximum)	ASTM D974
ASTM color	8	8	(maximum)	ASTM D1500
Foaming Characteristics (tendency, stability)				ASTM D892
Sequence I	5, 0	5, 0	mL (maximum)	
Sequence II	20, 0	20, 0	mL (maximum)	
Sequence III	5, 0	5, 0	mL (maximum)	

3.4 Performance.

3.4.1 Copper corrosion. When tested for a duration of three hours at a temperature of 100°C using ASTM test method D130, the corrosion produced shall not exceed No. 2 on the ASTM Corrosion Scale in accordance with the D130 test method.

4. VERIFICATION

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

a. Qualification inspection (see 4.2).

b. Quality conformance inspection (see 4.3).

4.2 Qualification inspection.

4.2.1 Qualification sampling. The qualification sample shall consist of a 1-gallon aliquot of the finished gear oil. At the discretion of the qualifying activity, a separate 1-ounce aliquot of the load-carrying additive may also be required. Information as noted in 6.4.2 must accompany the submission of a qualification sample.

4.2.2 Qualification testing. The qualification sample(s) shall be tested as specified in 4.4, Methods of Inspection.

4.2.3 Retention of qualification. In order to retain a qualified status and listing on the Qualified Products List (QPL), the manufacturer shall verify by certification to the qualifying activity that the product complies with the requirements of this specification. Periodic verification by certification shall be performed in two-year intervals from the date of original qualification. The qualification activity reserves the right to re-examine the qualified product whenever deemed necessary to determine whether the product continues to meet any of the specification requirements.

4.3 Quality conformance inspection. The conformance inspection shall include the test for viscosity, viscosity index, flash point, acid number, copper corrosion, pour point, precipitation number, foaming characteristics, and load wear index as described in 3.3 and 3.4. Samples shall be labeled completely with information identifying the purpose of the sample, name of the product, specification number, lot and batch number (see 6.7), date of sampling, and contract number.

4.4 Method of inspection.

4.4.1 Inspection. Unless otherwise specified, inspection testing shall be performed in accordance with 4.4.2 and the contractual requirements.

4.4.2 Physicochemical values. Testing shall be performed in accordance with the applicable methods specified in Table I and 3.4.1. Values for the physicochemical properties specified in section 3 apply to the arithmetic average of the determinations made on the samples for those values that fall within any stated repeatability or reproducibility limits of the applicable test methods.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. 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.

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 two grades of gear oil covered by this specification are intended for use in light-to-moderate-loaded gear trains or gear boxes that operate in low-to-medium-speed ranges down to -40°C.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.

b. Grade and quantity of oil required.

c. Packaging requirements (see 5. 1) to include size and type of container, level of packaging and level of packing required.

6.2.1 Purchase unit. The oil will be purchased by volume with the unit of volume being a U.S. gallon of 231 cubic inches at 15.6°C (60°F).

6.3 Material Safety Data Sheets. Contracting officers will identify those activities that require copies of completed Material Safety Data Sheets (MSDS) prepared in accordance with FED-STD-313. The pertinent Government mailing addresses for submission of data are listed in FED-STD-313.

6.4 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Products List QPL No. 6086 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 orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from HQ AFPET/PTPT, 2430 C Street, Bldg 70, Area B, Wright-Patterson AFB, OH 45433-7632. An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at https://assist.daps.dla.mil.

6.4.1 Qualification information. It is understood that the material furnished under this specification subsequent to final approval will be of the same composition and will be equal to products upon which approval was originally granted. In the event that the oil under contract is found to deviate from the composition of the approval product, or that the product fails to perform satisfactorily, approval of such products will be subjected to immediate withdrawal from the QPL at the discretion of the qualifying activity.

6.4.2 Information to accompany qualification samples. Qualification samples must be submitted with an MSDS and the following information:

a. A certified test report containing complete information as to the source and type of base stock and additive materials used for the test.

b. The detailed formulation and composition of the finished product.

c. Laboratory data showing quantitative results of all tests required by this specification. The samples and reports will be forwarded to HQ AFPET/PTPT, 2430 C Street, Bldg 70, Area B, Wright-Patterson AFB, OH 45433-7632.

d. The samples will be plainly identified by securely attached durable tags or labels marked with the following information:

1. Sample for qualification inspection with grade identity: LUBRICATING OIL, GEAR
2. Specification MIL-PRF-6086
3. Name of ingredient (for ingredient materials)
4. Name of manufacturer
5. Product code number
6. Date of manufacture

6.4.2.1 Formulation sheet example. An example of a satisfactory form for the formulation sheet, indicating the weight percentage and nature of each ingredient, is as follows:

a. Petroleum oil base stock (composition) percentage

b. Load carrying additive (manufacturer's name and number) percentage

6.5 International agreements. Certain provisions of this specification are the subject of international standardization agreements, ASIC Air Standard 15/1 and NATO STANAG 1135. When any amendment, revision or cancellation of this specification is proposed that will effect or violate an international agreement, the departmental custodians will inform their respective Departmental Standardization Office (DepSo) so appropriate action may be taken with respect to the applicable international agreement.

6.6 Disposal actions.

6.6.1 Background. Waste oil will be disposed of through a waste oil recovery program unless prohibited by local law. The oil will be disposed of in accordance to local law and regulations promulgated by the U.S. Environmental Protection Agency under Public Law 94-580, Resource Conservation and Recovery Act of 1976.

6.6.2 Handling and safety precautions. Personnel handling the oil will wear appropriate impervious clothing to prevent repeated or prolonged skin contact. Local appraisal is required for exact health and safety complications and to prescribe precise application of protective clothing. If skin or clothing becomes moistened with the product, personnel will promptly wash with soap or mild detergent and water. Respirators are not required unless there is an inhalation exposure to mists. Personnel will wear protective clothing when using the product and when cleaning up spills.

6.7 Definitions.

6.7.1 Bulk lot. A bulk lot (batch) is an indefinite quantity of a homogeneous mixture of material (see 3.2) 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.

6.7.2 Packaged lot. A packaged lot is an indefinite number of one-quart cans, or other unit containers of identical size and type, offered for acceptance and filled with a homogeneous mixture of material (see 3.2) from a single, isolated container; or filled with a homogeneous mixture manufactured in a single plant run (not exceeding 24 hours) through the same processing equipment, with no change in the ingredient materials.

6.8 Subject term (key word) listing.

Flash point
Foaming characteristics
Gear boxes
Gear trains
Viscosity

6.9 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.

CONCLUDING MATERIAL

Custodians:
Army – MR
Navy – AS
Air Force – 68
DLA – GS

Review activities:
Army – AT, MI, MD1
Navy – SA, SH
Air Force – 11,
DLA – PS

Preparing activity:
Air Force – 68
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Note: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information using the ASSIST Online database at https://assist.daps.dla.mil.