

INCH-POUND

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SUPERSEDING

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PERFORMANCE SPECIFICATION
GREASE, TRANSMISSION, HELICOPTER
(NATO G-396)



Comments, suggestions, or questions on this document should be addressed to AFPA/PTPS
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AMSC N/A

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

1. SCOPE

1.1 Scope. This specification covers one type of extreme pressure, anti-wear helicopter transmission grease. This grease is identified by NATO Code Number G-396 (see 6.3).

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 or 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 requirements of documents cited in sections 3 or 4 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.

ASTM International

ASTM D217	Standard Test Methods for Cone Penetration Of Lubricating Grease (DoD Adopted)
ASTM D972	Standard Test Method for Evaporation Loss of Lubricating Greases and Oils (DoD Adopted)
ASTM D1478	Standard Test Method for Low-Temperature Torque of Ball Bearing Grease (DoD Adopted)
ASTM D2266	Standard Test Method for Wear Preventative Characteristics of Lubricating Grease (Four-Ball Method) (DoD Adopted)
ASTM D2596	Standard Test Method for Measurement of Extreme-Pressure Properties of Lubricating Grease (Four-Ball Method) (DoD Adopted)
ASTM D4057	Standard Practice for Manual Sampling of Petroleum and Petroleum Products (DoD Adopted)
ASTM D6184	Standard Test Method for Oil Separation from Lubricating Grease (Conical Sieve Method) (DoD Adopted)

(Copies of these documents are available online at <http://www.astm.org>)

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 (except for related specification sheets), 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 Toxicity. The materials shall have no adverse effect on the health of personnel when used for their intended purpose.

3.2 Materials. The physical composition of the grease shall be such that the material passes the requirements in section 3. The grease shall be a homogenous mixture of base fluids, thickener(s), and additives as necessary. A formulation of polyol aliphatic ester, a fluorinated polysiloxane, a sodium montmorillonite clay, fluorinated ethylene propylene copolymer, antimony dialkyldithiocarbamate, and other additives as necessary is recommended but not mandatory.

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3.3 Properties of finished fluid. The properties of the finished fluid shall be as specified in 3.3 when tested as specified in section 4.

3.3.1 Unworked penetration. The unworked penetration (as measured in units of 0.1 mm) of the grease shall be a maximum of 340 when tested as specified in 4.4.1.

3.3.2 Worked penetration. The worked penetration (as measured in units of 0.1 mm) of the grease shall be a maximum of 340 when tested as specified in 4.4.1.

3.3.3 Worked stability. The penetration (as measured in units of 0.1 mm) of the grease after working 100,000 double strokes shall be a maximum of 375 when tested as specified in 4.4.1.

3.3.4 Evaporation. The grease shall not lose more than 5 percent of its weight after 22 hours at 300°F (148.9°C) when tested as specified in 4.4.1.

3.3.5 Oil separation. The grease shall not lose more than 10 percent of its weight after 30 hours at 300°F (148.9°C) when tested as specified in 4.4.1.

3.3.6 Load wear index. The load wear index value of the grease shall be not less than 90 when tested for load carrying capacity as specified in 4.4.1.

3.3.7 Steel on steel wear. When tested as specified in 4.4.1 the wear scar diameters shall not be greater than those listed in table I. The temperature shall be monitored and recorded for the ambient temperature, four hour test and the temperature shall be regulated at 167°F (75°C) for the two hour test.

TABLE I. Steel on steel wear test

Specimen Material	Test Duration	Temperature, °F	Scar Diameter (mm)
AISI-E-52100 Steel	2 hours	167 (75°C)	1.30 maximum
AISI-E-52100 Steel	4 hours	Ambient	1.30 maximum

3.3.8 Low temperature torque. A number 6204 open ball bearing lubricated with grease shall give a starting torque of not more than 3,000 g-cm and a running torque of not more than 1,000 g-cm when tested as specified in 4.4.1.

3.3.9 Storage stability. After storing for six months as specified in 4.4.2, the worked penetration (as measured in units of 0.1 mm) of the grease shall not have changed from the original worked penetration by more than 30 points. The unworked penetration shall be a minimum of 250 (as measured in units of 0.1 mm).

3.3.10 Workmanship. The grease shall be a high quality, smooth, homogenous product, free from abrasives and impurities when examined as specified in 4.4.3.

3.4 Recycled, recovered, environmentally preferable or biobased materials. Recycled, recovered, environmentally preferable or biobased 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.

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4. VERIFICATION

4.1 Classification of tests. The inspection and testing of the grease shall be classified as acceptance tests (see 4.1.1).

4.1.1 Acceptance tests. Tests for acceptance of individual and bulk or packaged lots (see 6.7) shall consist of tests for worked penetration, evaporation, and steel on steel wear at 167°F (75°C) for 2 hours.

4.2 Sampling. Sampling shall be in accordance with ASTM D4057.

4.3 Inspection. Refer to the contract or purchase order for specific inspection requirements.

4.4 Test procedures.

4.4.1 List of test methods. The tests of this specification shall be conducted in accordance with the applicable test method as listed in table II and other methods as described in 4.4.2 and 4.4.3.

TABLE II. Test methods

Test	ASTM Method
Penetration	D217
Worked stability	D217
Evaporation	D972
Oil separation	D6184
Load wear index	D2596
Steel on steel wear ¹	D2266
Low temperature torque	D1478
Note: 1. The test specimen materials, test temperature, and length of tests shall be as specified in Table I.	

4.4.2 Storage stability. The penetration after storage shall be determined on a sample of grease which has been stored at a temperature of 100°F +/- 5°F (38°C +/- 3°C) in a 1-pound (0.454 kg) oil tight container for 6 months subsequent to the original determination of the penetration. The worked and unworked penetrations after storage shall be determined in accordance with ASTM D217.

4.4.3 Examination of the product. The sample grease shall be inspected visually and a suitable portion shall be worked with a spatula on a glass surface. After working, the grease shall be spread with a straight edge and observed for uniformity as indicated by a smooth surface.

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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 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 grease covered by the specification is intended for use in military helicopter tail rotors, intermediate transmissions, and gear boxes. Other applications include screw jack actuators, fine pitch gear trains, servomechanisms, journal bearings, and helicopter rotor hubs.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Quantity required.
- c. Packaging requirements (see section 5.1).

6.3 International Standardization Agreements. Certain provisions of this specification are the subject of International Standardization Agreement, NATO Code Number G-396. When amendment, revision, or cancellation of this specification is proposed, the preparing activity must coordinate the action with the U.S. National Point of Contact for the International Standardization Agreement, as identified in the ASSIST database at <https://assist.dla.mil>.

6.4 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.

6.5 Shelf-life. This specification covers items where the assignment of a Federal shelf-life code is a consideration. Specific shelf-life requirements should be specified in the contract or purchase order, and should include, as a minimum, shelf-life code, shelf-life package markings in accordance with MIL-STD-129 or FED-STD-123, preparation of a material quality storage standard for type II (extendible) shelf-life items, and a minimum of 85 percent shelf-life remaining at the time of receipt by the Government. These and other requirements, if necessary, are in DoD 4140.27-M, Shelf-Life Management Manual. The shelf-life codes are the in Federal Logistics Information System Total Item Record. Additive information for shelf-life management may be obtained from DoD 4140.27-M, or the designated shelf-life Points of Contact (POC). The POC should be contacted in the following order: (1) the Inventory Control Points that manage the item and (2) the DoD Service and Agency administrators for the DoD Shelf-Life Program. Appropriate POCs for the DoD Shelf-Life Program can be contacted through the DoD Shelf-Life Management website: <https://www.shelflife.hq.dla.mil/>.

6.6 Subject term (keyword) listing.

Extreme pressure grease

Anti-wear grease

Tail rotor

Gear box

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6.7 Definitions.

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

6.7.2 Packaged lot. An indefinite number of 55 gallon (208.2 liter) drums or smaller unit packages of identical size and type, offered for acceptance, and filled with a homogenous mixture of material manufactured by a single plant run (not exceeding 24 hours) through the same processing equipment, with no change in ingredient material.

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.

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