

METRIC

MIL-PRF-83261C

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SUPERSEDING

MIL-PRF-83261B (USAF)

13 February 1998

PERFORMANCE SPECIFICATION
GREASE, AIRCRAFT, EXTREME PRESSURE, ANTI-WEAR



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AMSC N/A

FSC 9150

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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 grease intended to lubricate aircraft accessories which operate at high speeds and under heavy loads in a temperature range of -73°C to +232°C.

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. Government documents.

2.2.1 Specification and standards. 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.

FEDERAL SPECIFICATIONS

FED-STD-791 Testing Method of Lubricants, Liquid Fuels, and Related Products

(Copies of these documents are available online at <https://assist.daps.dla.mil/quicksearch/> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094)

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 these documents are those cited in the solicitation or contract.

ASTM, INTERNATIONAL

ASTM D217	Cone Penetration of Lubricating Grease (DoD Adopted)
ASTM D1264	Determining the Water Washout Characteristics of Lubricating Greases (DoD Adopted)
ASTM D1478	Low-Temperature Torque of Ball Bearing Grease (DoD Adopted)
ASTM D1742	Oil Separation from Lubricating Grease During Storage (DoD Adopted)
ASTM D2266	Wear Preventative Characteristics of Lubricating Grease (Four-Ball Method) (DoD Adopted)
ASTM D2595	Evaporation Loss of Lubricating Greases Over Wide-Temperature Range (DoD Adopted)
ASTM D2596	Measurement of Extreme-Pressure Properties of Lubricating Grease (Four-Ball Method) (DoD Adopted)
ASTM D3336	Life of Lubricating Greases in Ball Bearings at Elevated Temperatures (DoD Adopted)
ASTM D4057	Manual Sampling of Petroleum and Petroleum Products (DoD Adopted)

(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)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE AMS 6447	Steel Bars, Forgings, and Tubing 1.4CR (0.98 – 1.10C) (SAE 52100) Electroslag Remelted (DoD Adopted)
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SAE AMS 6491

Steel Bars, Forgings, and Tubing 4.1CR – 4.0MO – 1.0V (0.80 – 0.85C) Premium Aircraft-Quality for Bearing Applications, Double Vacuum Melted (M-50) (DoD Adopted)

(Copies of these documents are available online at <http://www.sae.org> or SAE International, 400 Commonwealth Drive, Warrendale PA 15096-0001 USA)

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 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 First article. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.2.

3.3 Materials. The grease shall be a mixture consisting of a base fluid, a gelling agent and the necessary additives. A formulation of a fluorinated polysiloxane fluid, a non-soap gelling agent, and the necessary additives is recommended but is not mandatory.

3.4 Properties of finished fluid. The properties of the finished fluid shall be in accordance with those listed in 3.4 and Table I.

3.4.1 Un-worked penetration. The un-worked penetration (as measured in units of 0.1 mm) of the grease shall be a minimum of 280 when tested as specified in 4.4.3.

3.4.2 Worked penetration. The worked penetration (as measured in units of 0.1 mm) of the grease shall be a minimum of 270 and a maximum of 350 when tested as specified in 4.4.3.

3.4.3 Workmanship. The grease shall be a high quality, smooth, homogenous product free from abrasives and impurities when examined as specified in 4.4.2.

4. VERIFICATION

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

- a. First article inspection (see 4.2).
- b. Quality conformance inspection (see 4.3).

4.2 First article inspection

4.2.1 First article samples. When required, a first article inspection shall be performed on a 5 kg (12.5 pound) sample from a bulk lot (see 6.3) to determine conformance with section 3.

4.2.2 First article tests. First article sample(s) shall be subjected to all the tests specified in 4.4 and table II.

4.3 Quality conformance inspection. Quality conformance inspections shall consist of sampling plans A and B. Samples shall be labeled completely with information which identifies the purpose of the sample, name of the product, specification number, lot/batch number (see 6.3), date of sampling and contract number.

4.3.1 Sampling plan A. A 5 kg (12.5 pound) sample from a bulk lot (see 6.3) shall be selected in accordance with ASTM D4057 and subjected to inspection and tests specified in 4.4.1 and 4.4.2, and

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shall be subjected to inspections for penetration, evaporation, and steel-on-steel wear as specified in table II. If the packaged sample size is less than 0.2 kg (0.5 pound), all tests in sampling plan B (see 4.3.2) will also be run on the sample from the bulk lot. The inspection lot shall be rejected if the sample fails any of the tests.

4.3.2 Sampling plan B. A random sample of filled unit containers shall be selected from each packaged lot (see 6.3) of fluid in accordance with the table III. This sample(s) shall be subjected to inspections for worked stability, oil separation, load carrying capacity, water resistance, low temperature torque, and high temperature performance, as specified in table II. If any sample fails, the lot shall be rejected.

TABLE I. Physical properties of grease

CHARACTERISTIC	PERFORMANCE	LIMITS	UNITS
Penetration, Unworked		280, minimum	0.1 mm
Penetration, Worked		270 – 350	0.1 mm
Worked Stability, 100,000 Strokes Penetration		375, maximum	0.1 mm
Evaporation		15.0, maximum	percent
Oil Separation		20.0, maximum	percent
Load Carrying Capacity		90, minimum	kg
Water Resistance		20, maximum	percent
Steel-on-Steel Wear, 52100 Steel		1.30 maximum	mm
Steel-on Steel Wear, M-50 Steel		1.30 maximum	mm
Storage Stability, Penetration Unworked		200, minimum	0.1 mm
Storage Stability, Penetration Worked (Change from Original)		30, maximum	0.1 mm
Low Temperature Torque	Starting	5000, maximum	g/cm
Low Temperature Torque	Running	1000, maximum	g/cm
High Temperature Performance	Average 4 Tests	500, maximum	hours

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4.4 Method of inspection.

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

4.4.2 Examination of the product. Sample grease (see 3.3) 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.

4.4.3 Storage stability. Penetration after the storage test shall be determined on a sample of grease (see 3.2) which has been stored at a temperature of $38^{\circ}\text{C} \pm 3^{\circ}\text{C}$ in a 0.5 kg (1 pound), oil-tight container for 6 months subsequent to the original determination of penetration. The unworked and worked penetration after storage shall be determined in accordance with ASTM D217.

TABLE II. Test methods for grease

CHARACTERISTIC	TEST METHOD		TEST PARAGRAPH
	FED-STD-791	ASTM	
Penetration, Unworked		D217	
Penetration, Worked		D217	
Storage Stability			4.4.3
Worked Stability	313.3		
Evaporation ^{1/}		D2595	
Oil Separation ^{1/}		D1742	
Load Carrying Capacity		D2596	
Water Resistance ^{2/}		D1264	
Steel-on-Steel Wear, 52100 Steel ^{3/}		D2266	
Steel-on-Steel Wear, M-50 Steel ^{4/}		D2266	
Low Temperature Torque ^{5/}		D1478	
High Temperature Performance ^{1/}		D3336	
Notes ^{1/} The test temperature shall be 232°C . ^{2/} The test temperature shall be $38^{\circ}\text{C} \pm 3^{\circ}\text{C}$. ^{3/} The test temperature for 52100 steel shall be 75°C , in accordance with AMS 6447. ^{4/} The test temperature for M-50 steel shall be 232°C , in accordance with AMS 6491. ^{5/} The test temperature shall be $-73^{\circ}\text{C} \pm 3^{\circ}\text{C}$.			

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TABLE III. Sample plan B

LOT SIZE	SAMPLE SIZE
1-4	All
5-50	5
51-90	7
91-150	11
151-280	13
281-500	16
501-12,000	19
(acceptance number is zero, [c = 0])	

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 aircraft actuators, gears, gearboxes, anti-friction bearings, plain spherical bearings, miniature bearings, and other applications that involve heavy loads and sliding, rolling, or oscillatory motions. It is particularly suitable for use over the temperature range of -73°C to +232°C.

6.2 Acquisition requirements. Acquisition documents should specify the following:

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

6.3 Definitions.

6.3.1 Bulk lot. A bulk lot (batch) is an indefinite quantity of a homogenous mixture of material (3.2) offered for acceptance in a single, isolated container; or manufactured in a single plant run (not to exceed 24 hours), through the same processing equipment, with no change in ingredient material.

6.3.2 Packaged lot. A packaged lot is an indefinite number of 55-gallon drums, or smaller unit

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containers (such as one-gallon cans) of identical size and type, offered for acceptance and filled with a homogenous mixture of material from one isolated container; or filled with a homogeneous mixture of material manufactured in a single plant run (not to exceed 24 hours), through the same processing equipment, with no change in ingredient material.

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.

Evaporation
Fluorinated
Oil separation
Polysiloxane fluid
Worked stability

6.7 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:
Air Force - 68
DLA-GS

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>.