

MIL-G-25537C
29 June 1984
SUPERSEDING
MIL-G-25537B
10 October 1972

MILITARY SPECIFICATION

GREASE, AIRCRAFT, HELICOPTER OSCILLATING BEARING, NATO CODE NUMBER G-366, METRIC

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

1 SCOPE

1.1 Scope This specification covers the requirements for one grade of grease for use in aircraft bearings having oscillatory motion of small amplitude. This grease is identified by NATO symbol G-366 (see 6.5).

2 APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. Unless otherwise specified, the following specifications, standards, and handbooks of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this specification to the extent specified herein.

STANDARDS

FEDERAL

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

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to Engineering Specifications and Standards Department (Code 93), Naval Air Engineering Center, Lakehurst, NJ 08733, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

MIL-G-25537C

STANDARDS (continued)

MILITARY

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

2.1 2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications for a part of this specification to the extent specified herein

PUBLICATIONS

CODE OF FEDERAL REGULATIONS

- 49 CFR - Transportation - Hazardous Materials.

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, DC 20402.)

(Copies of specifications, standards, handbooks, drawings, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- ANSI Z129.1 - American National Standard for the Precautionary Labeling of Hazardous Industrial Chemicals.

(Application for copies should be addressed to the American National Standards Institute, 1430 Broadway, New York, NY 10018.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM D 217 - Cone Penetration of Lubricating Grease
 ASTM D 942 - Oxidation Stability of Lubricating Greases by the Oxygen Bomb Method.
 ASTM D 1478 - Low-Temperature Torque of Ball Bearing Greases.
 ASTM D 1743 - Corrosion Preventive Properties of Lubricating Greases.
 ASTM D 2265 - Dropping Point of Lubricating Grease Over Wide Temperature Range.
 ASTM D 2595 - Evaporation Loss of Lubricating Greases Over Wide Temperature Range

MIL-G-25537C

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) (continued)

- ASTM D 4048 - Detection of Copper Corrosion from Lubricating Grease by the Copper Strip Tarnish Test.
 ASTM D 4057 - Manual Sampling of Petroleum and Petroleum Products
 ASTM D 4177 - Automatic Sampling of Petroleum and Petroleum Products

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

(Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence

3. REQUIREMENTS

3.1 Qualification. The grease furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.3 and 6.3).

3.2 Material. The grease shall consist essentially of a low temperature liquid lubricant and a suitable gelling agent. The right is reserved to subject greases of new or unusual composition, submitted for qualification, to such additional tests as are considered necessary to assure the serviceability of the materials with military equipment.

3.3 Physical properties. Physical properties of the grease shall be in accordance with Table I.

3.4 Material safety data sheets. Material safety data sheets shall be prepared and submitted in accordance with FED-STD-313. Material safety data sheets shall also be forwarded as specified in 4.3.2. The grease shall have no adverse effect on the health of personnel when used for its intended purpose. Questions pertinent to this effect shall be referred by the contracting activity to the appropriate departmental medical service who will act as an advisor to the contracting agency (see 4.3.2 and 6.2.1e).

3.5 Workmanship. The grease shall be a homogeneous mixture, uniform in appearance, free from lumps, abrasive material or otherwise undesirable fillers or impurities. The grease, while being worked with a spatula on a glass surface shall show no non-uniformity and shall, when spread with a straight edge, have a smooth surface

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

MIL-G-25537C

or any other 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.

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

- a Qualification inspection (see 4.3)
- b Quality conformance inspection (see 4.4).

4.3 Qualification inspection. Qualification inspection shall consist of a review of the manufacturer's test report (see 4.3.2) to determine that the qualification inspection sample (see 4.3.1) complies with all the requirements for the physical properties specified in Table I when tested in accordance with the inspection methods specified in Table II.

4.3.1 Qualification inspection sample. The qualification inspection sample shall consist of 5 kilograms (10 pounds) of grease. The sample shall be forwarded to the Aircraft and Crew Systems Technology Directorate, Code 60612, Naval Air Development Center, Warminster, PA 18974. The sample shall be plainly identified by a securely attached durable tag or label marked with the following information:

Sample for qualification inspection
 GREASE, AIRCRAFT; HELICOPTER OSCILLATING BEARING, NATO CODE NUMBER
 G-366.
 Name of manufacturer.
 Product code number.
 Batch number.
 Date of manufacture.
 Submitted by (name) (date) for qualification inspection in
 accordance with MIL-G-25537C under authorization of (reference
 authorizing letter) (see 6.3).

4.3.2 Test reports Two copies of the manufacturer's test report, containing complete test data showing that material submitted for qualification conforms to the requirements of this specification, shall be submitted with the qualification sample. Location and identity of the plant which produced the sample tested shall also be supplied. Material safety data sheets on toxicity shall be prepared as specified in 3.4 and shall be submitted to the qualifying laboratory (see 4.3.1).

4.3.3 Retention of qualification In order to retain qualification of a product approved for listing on the Qualified Products List (QPL), the manufacturer shall verify by certification to the qualifying activity, that the manufacturer's product complies with the requirements of this specification. The time of periodic verification by certification shall be in two-year intervals from the date of original qualification. The Government reserves the right to re-examine the qualified product whenever deemed necessary to determine that the product continues to meet any or all of the specification requirements.

MIL-G-25537C

4.4 Quality conformance inspection. The quality conformance inspection of the grease shall consist of tests of samples from 4.4.2.2 in accordance with table III and an examination of samples from 4.4.2.1 for conformance with 4.6.1. Samples shall be labeled completely with the information identifying the purpose of the sample, name of product, specification number, lot and batch number, date of sampling and contract number.

4.4.1 Lot formation. A lot shall consist of all the grease produced by one manufacturer, at one plant, from the same materials and under essentially the same conditions, provided the operation is continuous and does not exceed a 24 hour period. In the event the process is a batch operation, each batch shall constitute a lot (see 6.4).

4.4.2 Sampling.

4.4.2.1 For examination of filled containers. A random sample of filled containers, fully prepared for delivery, shall be selected from each lot of grease in accordance with MIL-STD-105, inspection level II with an acceptable quality level (AQL) of 2.5 percent defective.

4.4.2.2 For tests. The sample for tests shall consist of two 2 kilogram samples of grease taken at random from filled containers from each lot of grease. For users who obtain grease in large containers, two 2 kilogram samples shall be taken in accordance with ASTM D 4057 or ASTM D 4177. The lot shall be unacceptable if either sample fails to comply with any of the tests specified in 4.6.2.

4.5 Inspection conditions.

4.5.1 Test conditions. Test conditions shall be in accordance with 4.6 and the physical values specified in Table I apply to the average of determinations made on the sample. Unless otherwise specified, all tests shall be conducted on unworked grease.

4.6 Methods of examinations and tests.

4.6.1 Examinations. Each of the filled containers, selected in accordance with 4.4.2.1, shall be examined for defects of the container and closure, for evidence of leakage and for unsatisfactory markings to determine conformance with 5.1. Each sample container shall also be weighed to determine the amount of contents. If the number of defective containers exceeds the acceptance number of the sampling plan specified in 4.4.2.1, the lot shall be rejected.

4.6.2 Tests. Tests shall be performed in accordance with Table II to determine conformance with the requirements specified in 3.3.

5 PACKAGING

5.1 Packaging, packing and marking. The grease shall be packaged, packed and marked in accordance with MIL-STD-290. The type and size of the containers and the level of packaging and packing shall be as specified by the acquiring activity (see 6.2.1).

MIL-G-25537C

5.1.1 Marking. All unit, intermediate and shipping containers shall be marked in accordance with MIL-STD-290 and Title 49 of the Code of Federal Regulations and any other additional special markings specified by the acquiring activity (see 6.2.1f). All unit and intermediate packs of toxic and hazardous chemicals and materials shall also be labeled in accordance with the applicable laws, statutes, regulations or ordinances, including Federal, State, and Municipal requirements. In addition, unit and intermediate containers, including unit containers that serve as shipping containers, such as pails and drums, shall be marked with the applicable precautionary information detailed in ANSI Z129.1

6. NOTES

6.1 Intended use. The grease is intended for use in bearings having oscillatory motion of small amplitude over the temperature range of 71°C to -54°C.

6.2 Ordering data

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number and date of this specification
- b. Quantity desired.
- c. Size and type of container for grease (see 5.1)
- d. Applicable levels of packaging and packing and other options (see 5.1).
- e. Specify DAR Clauses 7-104.98 and 1-323.2.
- f. Any special markings required (see 5.1.1).

6.3 Qualification. With respect to products requiring qualification, awards may be made only for products which are, at the time set for opening of bids, qualified for inclusion in Qualified Products List (QPL-25537) 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 purchase orders for the products covered by this specification. The activity responsible for the Qualified Products List is Commander, Naval Air Systems Command, Attn: AIR-5304C1, Washington, DC 20361; however information pertaining to qualification of products and letter of authorization for submittal of sample may be obtained from the Aircraft and Crew Systems Technology Directorate, Code 60612, Naval Air Development Center, Warminster, PA 18974

6.3.1 Qualification information. It is understood that the grease furnished under this specification subsequent to final approval should be of the same composition and shall be equal to products upon which approval was originally granted. In the event that the grease furnished under contract is found to deviate from the composition of the approved product, or that the

MIL-G-25537C

product fails to perform satisfactorily, approval of such products will be subject to immediate withdrawal from the Qualified Products List.

6.4 Batch A batch is defined as that quantity of material which has been manufactured by some unit chemical process and subjected to some physical mixing operation intended to make the final product substantially uniform.

6.5 International standardization agreements Certain provisions of this specification (see 1.1) are the subject of international standardization agreement, ASCC Air Standard 15/1, NATO STANAG NAT-STD-1135. When amendment, revision, or cancellation of this specification is proposed, which will modify the international agreement concerned, the preparing activity will take appropriate action through international standardization channels, including departmental standardization offices, to change the agreement or make other appropriate accommodations.

6.6 The Sikorsky Aircraft Friction Oxidation Tester, Model SKP-1721-1 used for the oscillation test (3.3) may be obtained from the Sikorsky Aircraft Div., United Aircraft Corp. N. Main St., Stratford, Conn. 06602

6.7 Changes from previous issue Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes

Custodians:

Army - ME
Navy - AS
Air Force - 20

Preparing activity:

Navy - AS

(Project No. 9150-0662)

Review activities

Army - AV
DLA - PS

International interests

NATO (see 6.5)

MIL-G-25537C

TABLE I. Physical properties.

| Characteristics | Limits |
|--|---|
| Odor | No odor of rancidity, perfume or free alcohol |
| Dropping point, °C , minimum | 140 |
| Penetration: | |
| Unworked, minimum | 200 |
| Worked | 265-305 |
| Worked stability, after 100,000 double strokes, penetration | 265-375 |
| Evaporation, percent, weight loss in 22 hours at 100°C , maximum | 7.0 |
| Oil separation, percent, weight loss in 30 hours, maximum | 5.0 |
| Oxidation, stability: | |
| Bomb oxidation, pressure drop, MPa , maximum: | |
| in 100 hours | 0.0345 |
| in 400 hours | 0.1378 |
| Corrosiveness (copper strip), maximum <u>1</u> / | 1b |
| Low temperature torque: <u>2</u> / at - 55°C | |
| Starting Nm , maximum | 1.47 |
| Running (after 60 minutes) Nm , maximum | 0.196 |
| Dirt particles per ml of grease, maximum: | |
| 25 - 74 micrometers diameter | 5,000 |
| 75 - 124 micrometers diameter | 1,000 |
| 125 micrometers diameter or larger | None |

MIL-G-25537C

TABLE I. Physical properties - Continued

| Characteristics | Limits |
|---|----------------|
| Water stability, penetration, worked, change, maximum, points, based on original worked penetration | 70 |
| Rust preventive properties <u>3/</u> | Pass |
| Oscillation, friction oxidation, hours, minimum | 250 |
| Storage stability, penetration: Unworked, minimum Worked | 200 265-305 |

- 1/ The grease shall show no green color in that portion contacting the copper strip. The copper strip shall not tarnish more than a classification of 1b when compared with the ASTM copper strip corrosion standards.
- 2/ There shall be no skidding or ball sliding during test.
- 3/ Two of the three test bearings shall show no discoloration or corrosion in excess of three small spots per bearing or pitting, or etching.

TABLE II. Inspection methods.

| Test | Method | |
|---|-------------|--------|
| | FED-STD-791 | ASTM |
| Dropping point | - | D 2265 |
| Penetration | - | D 217 |
| Worked stability | 313 | - |
| Evaporation | - | D 2595 |
| Oil separation | 321 | - |
| Bomb oxidation | - | D 942 |
| Corrosiveness (copper strip) <u>1/</u> | - | D 4048 |
| Low temperature torque <u>2/</u> | - | D 1478 |
| Dirt | 3005 | - |
| Water stability <u>3/</u> | 313 | - |
| Rust preventive properties | - | D 1743 |
| Storage stability <u>4/</u> | 3467 | - |
| Oscillation, friction oxidation | 6516 | - |

MIL-G-25537C

TABLE II. Inspection methods - Continued

- 1/ The test shall be conducted at 100°C for 24 hours
- 2/ Observations for skidding or ball sliding shall be made during test.
- 3/ A grease-water mixture shall be prepared by stirring nine parts of grease with one part tap water. The two components shall be blended, using a suitable electric mixer (kitchen type), until the mixture appears to be homogeneous. Penetration after prolonged working shall then be determined.
- 4/ Temperature of 40° ± 2°C to be maintained for 6 months.

TABLE III. Quality conformance tests

| Inspection | Paragraph | |
|----------------------------------|-------------|-------------|
| | Requirement | Test method |
| Odor | 3.3 | 4.6.2 |
| Dropping point | 3.3 | 4.6.2 |
| Penetration | 3.3 | 4.6.2 |
| Evaporation | 3.3 | 4.6.2 |
| Oil separation | 3.3 | 4.6.2 |
| Bomb oxidation (100 hrs only) | 3.3 | 4.6.2 |
| Corrosiveness (copper strip) | 3.3 | 4.6.2 |
| Low temperature torque | 3.3 | 4.6.2 |
| Dirt | 3.3 | 4.6.2 |
| Water stability | 3.3 | 4.6.2 |
| Examination of filled containers | 5.1 | 4.6.1 |

INSTRUCTIONS In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge (*DO NOT STAPLE*), and mailed. In block 5, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

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

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DEPARTMENT OF THE NAVY
Commanding Officer
Naval Air Engineering Center
Engineering Specifications and Standards Department
(ESSD), Code 93
Lakehurst, NJ 08733



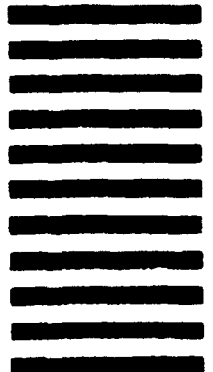
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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

| | | | |
|---|--|---|--|
| 1 DOCUMENT NUMBER MIL-G-25537C | | 2 DOCUMENT TITLE GREASE, AIRCRAFT, HELICOPTER OSCILLATING BEARING, NATO CODE NUMBER G-366, METRIC | |
| 3a NAME OF SUBMITTING ORGANIZATION | | 4 TYPE OF ORGANIZATION (Mark one) | |
| b ADDRESS (Street City State ZIP Code) | | <input type="checkbox"/> VENDOR | |
| | | <input type="checkbox"/> USER | |
| 5 PROBLEM AREAS | | <input type="checkbox"/> MANUFACTURER | |
| | | <input type="checkbox"/> OTHER (Specify) _____ | |
| | | a. Paragraph Number and Wording | |
| | | b. Recommended Wording | |
| | | c. Reason/Rationale for Recommendation | |
| 6 REMARKS | | | |
| 7a NAME OF SUBMITTER (Last First MI) - Optional | | b WORK TELEPHONE NUMBER (Include Area Code) - Optional | |
| c MAILING ADDRESS (Street City State ZIP Code) - Optional | | 8 DATE OF SUBMISSION (YYMMDD) | |

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