

NOT MEASUREMENT
SENSITIVE

VV-G-671F
October 12, 1989
SUPERSEDING
VV-G-671E
June 22, 1978

FEDERAL SPECIFICATION

GREASE, GRAPHITE

This specification was approved by the Assistant Administrator, Office of Federal Supply and Services, General Services Administration, for the use of all Federal Agencies.

1. SCOPE

1.1 Scope. This specification covers one grade of a lubricating grease with a moderate load-carrying capacity (see 6.10) and is identified by NATO code number G-412.

2. APPLICABLE DOCUMENTS

2.1 Specifications and standards. The following documents of the issues in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

Federal Standard:

FED-STD-313 - Material Safety Data Sheets, Preparation and Submission of.

(Activities outside the Federal Government may obtain copies of Federal specifications, standards, and commercial item descriptions, as outlined under General Information in the index of Federal Specifications and standards, and Commercial Item Descriptions. The index, which includes cumulative bimonthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing office, Washington, DC 20402.

(Single copies of this specification, other Federal specifications, and commercial item descriptions required by activities outside the Federal Government for bidding purposes are available without charge from General Services Administration Business service centers in Boston, MA; New York, NY; Philadelphia, PA; Washington, DC; Atlanta, GA; Chicago, IL; Kansas City, MO; Fort Worth, TX; Houston, TX; Denver, CO; San Francisco, CA; Los Angeles, CA; and Auburn, WA.

(Federal activities may obtain copies of Federal standardization documents and the Index of Federal Specifications, Standards, and Commercial Item Descriptions from established distribution points in their agencies.)

AMSC N/A

FSC 9150

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

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Military Specification:

DOD-G-82673 - Graphite, Natural, Powder, Technical.

Military Standards:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
 MIL-STD-129 - Marking for Shipment and Storage.
 MIL-STD-147 - Palletized Unit Loads.
 MIL-STD-290 - Packaging, of Petroleum and Related Products.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center, (ATTN; NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

2.1.2 Other Government document. The following other Government document 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 Lubricating Oils.

(Guideline CPL 2-2.38 may be obtained from OSHA Publication office, Room S-4203, 200 Constitution Avenue, NW, Washington, DC 20210.)

2.2 Non-Government publications. The following document(s) 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) Standards:

D 92 - Flash and Fire Points by Cleveland Open Cup.
 D 95 - Water in Petroleum Products and Bituminous Materials by Distillation.
 D 97 - Pour Point of Petroleum Oils.
 D 128 - Analysis of Lubricating Grease.
 D 217 - Cone Penetration of Lubricating Grease.
 D 445 - Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity).
 D 566 - Dropping point of Lubrication Grease.
 D 2266 - Wear Preventive Characteristics of Lubricating Grease (Four-Ball Method).
 D 2596 - Measurement of Extreme Pressure Properties of lubricating Grease (Four-Ball Method)
 D 4048 - Detection of Copper Corrosion from lubricating Grease by the Copper Strip Tarnish Test.
 D 4057 - Manual Sampling of Petroleum Products, Standard Practice for.

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

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

3. REQUIREMENTS

3.1 Material Safety Data Sheets. The contractor shall certify that no carcinogenic or potentially carcinogenic constituents are present as defined under the Hazard Communication Standard (HCS) (29 CFR 1910.1200). Certification to this effect shall be made available to the contracting officer or the contracting officer's designated representative. Men awarded a contract, the manufacturer shall submit to the contracting officer or designated representative Material Safety Data Sheets prepared in accordance with FED-STD-313 and CFR 1910.1200. When FED-STD-313 is a variance with the CFR, 29 CFR 1910.1200 shall take precedence, modify and supplement FED-STD-313.

3.2 Materials. The grease shall consist of a mineral lubricating Oil (virgin or rerefined oil) thickened with a calcium soap of one or more of the higher fatty acids and sufficient graphite of a particle size conforming to DOD-G-82673, grade IV and quality of 98 percent purity (see 6.3) to meet the requirements. The grease may also contain additives as necessary to meet these requirements.

3.2.1 Toxic products and formulations. The grease shall have no adverse effect on the health of personnel when used for its intended purpose. The grease shall contain no components which produce noxious vapors in such concentrations as to be an annoyance to personnel during formulation or normal use under conditions of adequate ventilation while exercising caution to avoid prolonged contact with the skin and while observing occupational safety and Health Administration (OSHA) guidelines. Questions pertinent to this effect shall be referred by the contracting activity to the contracting agency.

3.3 Chemical and physical requirements.

3.3.1 Requirements for the base stock. The base stock shall consist of mineral oil conforming to the requirements specified in table I.

TABLE I. Requirements for the mineral oil base.

Property	Value
Viscosity at 40 °C, kinematic, centistokes	
min.	57
max.	75
Flash point, °C., min	176
Pour point, °C, min	-24

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3.3.2 Requirements for the finished grease. The finished grease shall conform to the requirements specified in table II.

TABLE II. Requirements for the finished grease.

Characteristics	Limits
Mineral oil base, % min	75
Worked penetration (1/10 mm)	265-295
Four-ball weld point, kg, min	160
Four-ball wear, scar diameter, mm, max	0.600
Dropping point, °C, min	85
Water content, %, max	1.5
Free fatty acid, as oleic, % max	0.2
Free alkali, as Ca(OH) ₂ , % max	0.2
Ash, as sulfates, % max	5.0
Corrosion, copper strip	1b
Graphite content, % wt	
min	4.5
max	5.5

3.3.3 Graphite content. It has been found that grease containing approximately five percent of a commercial grade of microfine graphite can meet the requirements for minimum weld load. If the graphite is of sufficiently high purity, the grease can also meet the requirements for four-ball maximum wear scar diameter (see 3.2 and 6.3).

3.4 Workmanship. The grease shall be homogeneous, smooth in texture, free of entrapped air, and shall have no odor of rancidity, perfume, or free alcohol.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor may use his own 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 that supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of Sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the

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Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize session of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.2 Lot.

4.2.1 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 4.2.1.1).

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

4.3 Sampling.

4.3.1 Sampling for the examination of filled containers. A random sampling of filled unit containers shall be taken from each lot in accordance with MIL-STD-105.

4.3.2 Sampling for tests. The sample for tests shall consist of two 2.27 kilogram (kg) samples of grease taken at random from filled containers from each lot of grease. For users who obtain grease in large containers, two 2.27 kg samples shall be taken in accordance with ASTM D 4057. The lot shall be unacceptable if either sample fails to comply with any of the tests specified in 4.5.

4.4 Inspection. The grease shall be examined for conformance with 3.4 in addition, the manufacturer shall provide certification of non-carcinogenicity as specified in 3.2.1 (i.e.: materials are not considered carcinogenic or potentially carcinogenic).

4.4.1 Classification of inspection. The inspection requirements are classified as follows:

- a. Quality conformance inspection (see 4.5).
- b. Inspection of preparation for delivery (see 4.6).

4.4.2 Inspection conditions. Unless otherwise specified, all tests shall be conducted on unworked grease. The physical limits specified in table II shall apply to the average of determinations made on the sample.

4.4.3 Examination of filled containers. Samples taken in accordance with 4.3.1 shall be examined for compliance with MIL-STD-290 with regard to fill, closure, sealing and leakage requirements. Any container having one or more defects or under the required fill shall be rejected. If the number of defective or under filled containers exceeds the acceptance number for the appropriate sampling plan of MIL-STD-105, the lot represented by the sample shall be rejected.

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4.5 Quality conformance tests. Tests for quality conformance of individual lots shall consist of all of the requirements in section 3 and may be conducted in any plant or laboratory approved by the contracting officer or the designated representative.

4.5.1 Test methods. Perform tests in accordance with table III.

TABLE III. Quality conformance inspection test methods.

Tests	ASTM
Viscosity of mineral oil base	D 445
Flash point of mineral oil base	D 92
Pour point of mineral oil base	D 97
Mineral oil content of grease	D 128
Worked penetration	D 217
Four-ball - weld	D 2266
Four-ball wear scar	D 2596
Dropping point	D 566
Water content	D 95
Free fatty acid <u>1/</u>	D 128
Free alkali	D 128
Ash	D 128
Corrosion, copper strip	D 4048
Graphite content, % wt	D 128

1/ As an option, an extraction method, using Soxlet apparatus, can be used to remove graphite prior to performing the ASTM D 128 test.

4.6.1 Inspection of preparation for delivery.

4.6.1.1 Unit of product. For the purpose of inspection, a complete pack prepared for shipment shall be considered a unit of product.

4.6.1.2 Inspection lot. The inspection lot shall be as defined in 4.2.1 packed for shipment.

4.6.1.3 Sampling. Samples for examination of preparation for delivery shall be selected at random from each inspection lot in accordance with procedures prescribed in MIL-STD-105.

4.6.1.4 Examination. Samples selected in accordance with 4.6.1.3 shall be examined for the defects listed below. Each nonconforming item shall be classified as a defect. Each sample container shall also be weighed to determine the amount of contents.

No. Defect

- 101. Unit Containers not of the size (s) specified.
- 102. Unit containers not as specified in MIL-STD-290.

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- 103. Intermediate containers, when required, not as specified in MIL-STD-290.
- 104. Quantity and arrangement of unit containers positioned within intermediate containers, when required, not as specified in MIL-STD-290.
- 105. Quantity and arrangement of filled intermediate containers packed within exterior containers, when required, not as specified in MIL-STD-290.
- 106. Exterior containers, when required, not as specified in MIL-STD-290.
- 107. Marking not as specified herein and in MIL-STD-290.

4.7 Toxicological formulations. The contractor shall have the toxicological formulations and associated information available for review by the contracting activity to evaluate the safety of the material for proposed use.

5. PREPARATION FOR DELIVERY

5.1 Packaging and packing. Unit containers shall be the size or sizes specified (see 6.2) and shall comply with the applicable requirements of MIL-STD-290 for level B or C as specified (see 6.2). Intermediate containers, when required of the specified unit containers, shall be as specified therein. When exterior containers are required, they shall be in accordance with the level B or C requirements of MIL-STD-290, as specified (see 6.2).

5.2 Marking. In addition to any special or identification markings required by the contract or purchase/delivery order, all containers shall be marked in accordance with MIL-STD-129 and MIL-STD-290.

5.2 Palletization. When specified (see 6.2), the packed grease shall be pelletized in accordance with MIL-STD-147. Palletized load shall be marked in accordance with MIL-STD-290.

6. NOTES

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

6.1 Intended use. This graphite grease is intended for use in equipment or machinery equipped with compression-type grease cups when lubrication instructions of orders specify a NLGI No. 2 graphite grease. The use of this grease should be limited to equipment intended for operation in the temperature range from -23 to 60 °C. Use of this grease at temperatures below -23 °C or above 60 °C may not provide acceptable performance in equipment or machinery systems.

6.2 Acquisition requirements. Acquisition documents shall specify the following:

- a. Title, number, and date of the specification.
- b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
- c. Quantity of grease desired, in kilograms.
- d. Size and type of container for grease (see 5.1).

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- e. Level of packaging and packing required (see 5.1).
- f. When palletization is required (see 5.3).

6.3 Graphite content. Graphite conforming to the classification, grade IV-natural, with a purity of not less than 98 percent as defined in DOD-G-82637 should be used in percent by weight of the finished grease as indicated in table II.

6.4 Toxicity questions. Questions pertinent to the toxicity of the grease should be referred by the contracting activity to the appropriate departmental medical service who should provide answers.

6.5 International standardization. Certain provisions of this specification (see 1.1) are the subject of international standardization agreement (NATO STANAG 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 office to change the agreement or make other appropriate accommodations.

6.6 Interchangeability and compatibility. VV-G-671 grease is not substituted for (interchangeable with) any other greases except for NATO code number G-412 and the grease should not be intentionally admixed with other greases.

6.8 Disposal actions.

6.8.1 Background. Accumulated waste grease should have the exterior of the outer pack marked as containing graphite to assist disposal facilities to manage the product according to regulations promulgated by the US Environmental Protection Agency under Public Law 94-580, Resource Conservation and Recovery Act of 1976.

6.8.2 Handling and safety precautions. Personal handling the product should wear appropriate impervious clothing to prevent repeated or prolonged skin contact. Local appraisal is required for exact health and safety implications and compliance with OSHA regulations. Product labeling and Material Safety Data Sheets (MSDS) information should be used by safety and health office of using activity to prescribe precise application of protective measures. If skin or clothing becomes moistened with the product, personnel should promptly wash with soap or mild detergent and water. Respirators or dust mask are not required unless there is an inhalation exposure to fumes. Personnel should wear protective clothing when using the product and when cleaning up spills.

6.9 Material Safety Data Sheets (MSDS). The contracting officers should identify those activities requiring copies of completed Material Safety Data Sheets prepared in accordance with FED-STD-313. The pertinent government mailing addresses for submission of data are listed in appendix B of FED-STD-313.

6.10 Classification. The three previous grades under VV-G-671E, GG-1 (soft), GG-2 (medium), and GG-3 (hard), have been consolidated into one grade. This consolidation was based upon a requirement within NATO.

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6.11 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, (except for related associated detail specifications, specification sheets or MS standards), the text of this document takes precedence. Nothing in this document, however, supersedes, applicable laws and regulations unless a specific exemption has been obtained.

6.12 Subject term (key word) listing.

Compression-type grease cups
Equipment
Graphite
Grease
Lubrication
Machinery

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

6.14 AQL certification. This specification is certified to be in compliance with current Army Materiel Command (AMC) policy for the elimination of AQL's/LTPD's (Acceptable Quality Levels/Lot Tolerance Percent Defectives) from military specifications.

(Certified by/date *Michael A. Lewis* 10/10/89).

MILITARY INTERESTS:

Custodians

Army - ME
Air Force - 68

PREPARING ACTIVITY:

Army - ME

Project 9150-0795

Review activities

Army - AL, AR, AT, AV, CD, SM, TE
Navy - MC, SA
DLA - GS

User activities

Navy - AS, SH, YD,
DOD -NS

International interest: (see 6.5)

CIVIL AGENCY INTEREST

GSA