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VV-G-671G

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SUPERSEDING

VV-G-671F

October 12, 1989

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 6.9) and is identified by NATO code number G-412.

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 Specifications, standards, and handbooks. The following specifications, standards, and handbooks 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).

Comments, suggestions, or questions on this document should be addressed to U.S. Army RDECOM, Tank Automotive Research, Development and Engineering Center, ATTN: RDTA-EN/STND/TRANS MS #268, 6501 E. 11 Mile Road, Warren, MI 48397-5000 or emailed to usarmy.detroit.rdecom.mbx.tardec-standardization@mail.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.dla.mil>.

AMSC N/A

FSC 9150

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

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FEDERAL STANDARDS

- FED-STD-313 - Material Safety Data, Transportation Data, and Disposal Data for Hazardous Materials Furnished to Government Activities

DEPARTMENT OF DEFENSE SPECIFICATIONS

- DOD-G-82673 - Graphite, Natural, Powdered, Technical

DEPARTMENT OF DEFENSE STANDARDS

- MIL-STD-129 - Marking for Shipment and Storage
- MIL-STD-147 - Palletized Unit Loads
- MIL-STD-290 - Packaging, of Petroleum and Related Products

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

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications 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.

DEPARTMENT OF LABOR (DOL)

- OSHA 29 CFR 1910.1200 - Hazard Communication

(Copies of this document may be obtained from OSHA Publication office, Room S-4203, 200 Constitution Avenue, NW, Washington, DC 20210.)

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 (see 6.2).

ASTM INTERNATIONAL

- ASTM D92 - Flash and Fire Points by Cleveland Open Cup Tester
- ASTM D95 - Water in Petroleum Products and Bituminous Materials by Distillation
- ASTM D97 - Pour Point of Petroleum Products
- ASTM D128 - Analysis of Lubricating Grease
- ASTM D217 - Cone Penetration of Lubricating Grease
- ASTM D445 - Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)

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- ASTM D566 - Dropping Point of Lubricating Grease
- ASTM D2266 - Wear Preventive Characteristics of Lubricating Grease (Four-Ball Method)
- ASTM D2596 - Measurement of Extreme Pressure Properties of Lubricating Grease (Four-Ball Method)
- ASTM D4048 - Detection of Copper Corrosion from Lubricating Grease
- ASTM D4057 - Manual Sampling of Petroleum Products, Standard Practice for

(Copies of these documents are available from www.astm.org or ASTM International, P.O. Box C700, West Conshohocken, PA 19428-2959.)

AMERICAN SOCIETY FOR QUALITY (ASQ)

- ANSI/ASQ Z1.4 - Sampling Procedures and Tables for Inspection by Attributes

(Copies of this document are available from www.asq.org or American Society for Quality, 600 North Plankinton Avenue, Milwaukee, WI 53203.)

2.4 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 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. When 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 varies from the CFR, 29 CFR 1910.1200 shall take precedence, modify and supplement with FED-STD-313.

3.2 Materials. The grease shall consist of a mineral lubricating oil (virgin or refined 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, 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

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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

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 classification	1b
Graphite content, % wt	
min	4.5
max	5.5

3.3.3 Graphite content. The grease shall contain approximately five percent 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).

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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 Reserved.

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 ANSI/ASQ Z1.4.

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

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the appropriate sampling plan of ANSI/ASQ Z1.4, the lot represented by the sample shall be rejected.

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 Inspection of preparation for delivery.

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

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

4.6.3 Sampling. Samples for examination of preparation for delivery shall be selected at random from each inspection lot in accordance with procedures prescribed in ANSI/ASQ Z1.4.

4.6.4 Examination. Samples selected in accordance with 4.6.3 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.

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No. Defect

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

5.1 Packaging and packing. 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.

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.

5.3 Palletization. When specified (see 6.2), the packed grease shall be palletized 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 or orders specify a National Lubricating Grease Institute (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.

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6.2 Acquisition requirements. Acquisition documents shall specify the following:

- a. Title, number, and date of the specification.
- b. Issue of ASSIST to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2).
- c. Quantity of grease desired, in kilograms.
- d. Size and type of container for grease (see 5.1).
- 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 commercial classification, grade IV-natural, with a purity of not less than 98 percent as defined in DOD-G-82673 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.

6.7 Disposal actions.

6.7.1 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.

6.7.2 Handling and safety precautions. Personnel 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 masks 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.

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6.8 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.

6.9 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.

6.10 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.

6.11 Subject term (key word) listing.

Compression-type grease cups
Equipment
Lubrication
Machinery

6.12 Changes from previous issue. The margins of this specification are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only, and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

6.13 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.

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MILITARY INTERESTS:

Custodians:

Army – AT
Air Force – 68
Navy – AS

PREPARING ACTIVITY:

Army - AT

Project 9150-2014-002

Review activities:

Army – AR, AV, CD
Navy – AS, MC, SA, SH
DLA – GS
Other – NS

CIVIL AGENCY INTEREST

GSA

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 above using the ASSIST Online database at <https://assist.dla.mil>.