

NOT MEASUREMENT SENSITIVE
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MIL-PRF-3572C

15 May 2018

SUPERSEDING

MIL-PRF-3572B

21 January 2000

## PERFORMANCE SPECIFICATION

## LUBRICANT, COLLOIDAL GRAPHITE IN OIL

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

## 1. SCOPE

1.1 Scope. This specification covers colloidal graphite in oil lubricant primarily for ordnance but may be used for other purposes (see 6.1).

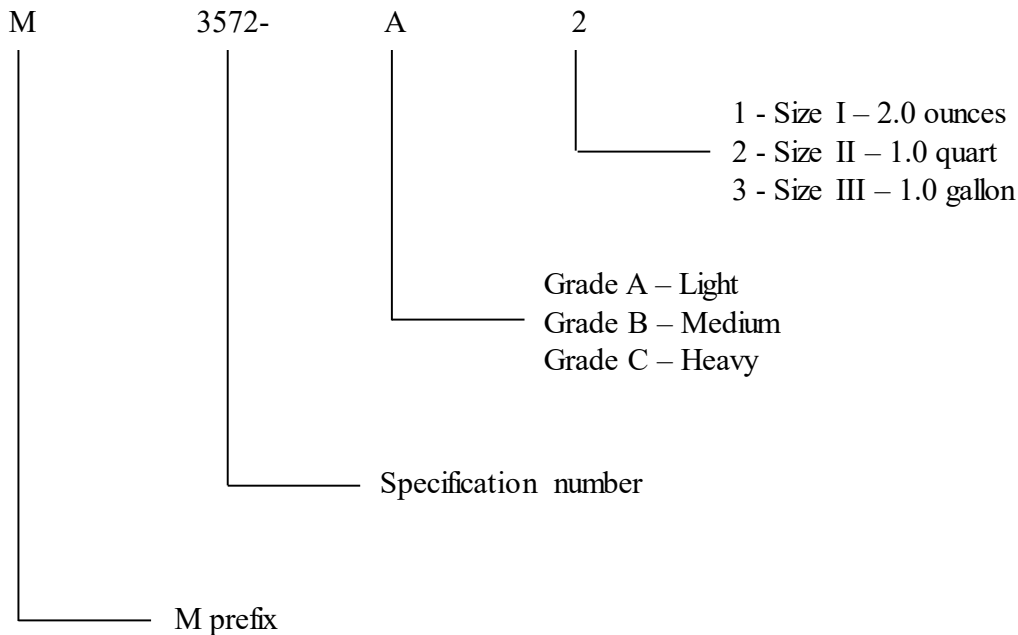
1.2 Classification. The lubricant covered by this specification should be of the grades and sizes, as specified (see 6.2):

Grade A – Light	Size I – 2.0 ounces
Grade B – Medium	Size II – 1.0 quart
Grade C – Heavy	Size III – 1.0 gallon

Beneficial comments, recommendations, additions, deletions, clarifications, etc. and any data that may improve this document should be sent to DLA Aviation, VEB, 8000 Jefferson Davis Highway, Richmond, VA 23297-5616 or e-mailed to <a href="mailto:STDZNMGT@dla.mil">STDZNMGT@dla.mil</a> . Since contact information can change, you may want to verify the currency of this address information using the ASSIST database at <a href="https://assist.dla.mil">https://assist.dla.mil</a> .
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1.3 Part or Identifying Number (PIN). PINs to be used for colloidal graphite in oil lubricant acquired to this specification are created as follows:



## 2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 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 and 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 (see 6.2).

### ASTM INTERNATIONAL (ASTM)

ASTM D92	Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester
ASTM D97	Standard Test Method for Pour Point of Petroleum Products
ASTM D445	Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)
ASTM D482	Standard Test Method for Ash from Petroleum Products
ASTM D524	Standard Test Method for Ramsbottom Carbon Residue of Petroleum Products

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## ASTM D2805 Standard Test Method for Hiding Power of Paints by Reflectometry

(Copies of these documents are available from <https://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, 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 Performance characteristics.

3.1.1 Materials and foreign matter. The lubricants shall consist of stabilized colloidal electric furnace graphite dispersed in refined mineral lubricating oils. Solids other than stabilized colloidal graphite shall not be used. The lubricants shall be homogeneous and free from lumps and foreign matter.

3.1.2 Physical and chemical requirements. The colloidal graphite in oil lubricants shall conform to the physical and chemical requirements shown in Table I.

TABLE I. Physical and chemical requirements.

Property	Grade A	Grade B	Grade C
Viscosity, mm <sup>2</sup> /s at 40 °C	19-25	--	--
Viscosity, mm <sup>2</sup> /s at 100 °C	--	22-27	57 (min)
Flash point, °C min.	140	160	160
Pour point, °C max.	-45	-9	-9
Solids content, mass percent	2.00 ± 0.005	10.00 ± 0.005	10.00 ± 0.005
Ash, mass percent max.	0.75	0.75	0.75
Hiding power of lubricant containing two mass percent solids, sq. ft. per gallon min.	1,200	1,200	900

3.1.3 Stability. After centrifuging, not less than 95 weight percent of the solids shall be in suspension for grades A and B and not less than 85 weight percent of the solids shall be in suspension for grade C.

3.1.4 Particle size, grades A and B. Over 50 percent of the graphite particles shall be smaller than one micron (in largest dimension). The remainder of the graphite particles shall be smaller than four microns.

3.2 Recycled, recovered, environmentally preferable, or bio-based materials. Recycled, recovered, environmentally preferable, or biobased materials should be used to the maximum

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extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

#### 4. VERIFICATION

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

4.2 Conformance inspection. Unless otherwise specified, conformance inspection shall consist of all of the requirements and verifications in Table II (see 6.2).

TABLE II. Verification Methods.

TITLE	REQUIREMENT	VERIFICATION
Performance requirements	3.1	4.3
Foreign matter	3.1.1	4.3.3
Viscosity	3.1.2, Table I.	4.3.4
Flash point	3.1.2, Table I.	4.3.5
Pour point	3.1.2, Table I.	4.3.6
Solids content	3.1.2, Table I.	4.3.7
Ash	3.1.2, Table I.	4.3.8
Hiding power	3.1.2, Table I.	4.3.9

4.3 Performance requirements verification. Complete the verifications in section 4.2 through section 4.3.11.1.

4.3.1 Verification methods. Acceptable verification methods included in this section are visual inspection, measurement, sample tests, full-scale demonstration tests, simulation, modeling, engineering evaluation, component properties analyses, and similarity to previously approved or previously qualified designs.

4.3.2 Verification alternatives. The manufacturer may propose alternative test methods, techniques, or equipment, including the application of statistical process control, tool control, or cost-effective sampling procedures to verify performance. Refer to the contract for alternatives that replace verifications required by this specification.

4.3.3 Foreign matter. The lubricant shall be visually inspected or examined for any lumps or foreign matter.

4.3.4 Viscosity. The viscosity shall be determined in accordance with ASTM D445.

4.3.5 Flash point. The flash point shall be determined in accordance with ASTM D92.

4.3.6 Pour point. The pour point shall be determined in accordance with ASTM D97.

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4.3.7 Solids content. The solids content (mass percent) shall be determined in accordance with ASTM D524. A sample of 0.5 g of the lubricant shall be used.

4.3.8 Ash. The ash (mass percent) shall be determined in accordance with ASTM D482. A sample of 10.00 g  $\pm$  0.10 g of the lubricant shall be used.

4.3.9 Hiding power. The hiding power of the lubricant (containing 2 mass percent of the solids) shall be determined by ASTM D2805.

4.3.9.1 Dilution of grades B and C. Grades B and C are too opaque for examination and shall be blended with a neutral refined petroleum oil of the characteristics given below. A 2.00 g  $\pm$  0.01 g portion of the grade B or C lubricant is diluted to 10.00 g  $\pm$  0.01 g with the oil specified above and the mixture thoroughly blended at a temperature of approximately 66 °C.

Relative density	0.8984-0.9100
Flash point, °C (minimum)	202
ISO viscosity grade	68
Viscosity, mm <sup>2</sup> /s at 100 °C	7 – 8

4.3.10 Stability. The stability shall be determined by centrifuging and analyzing samples using ASTM D524.

4.3.10.1 Grade. The stability test of grade A lubricant shall be determined on a representative sample of the product which has been thoroughly stirred to ensure uniformity. From sample, remove and analyze two portions specified and centrifuge as specified in 4.3.10.3.

4.3.10.2 Grades B and C. The stability test of grades B and C lubricants shall be conducted on a blend of one part of the lubricant with 49 parts of the neutral refined mineral oil specified in 4.3.9.1. Heat a 98 g portion of the neutral refined mineral oil to 66 C°  $\pm$  5 °C and blend thoroughly with the 2 g of the lubricant. Determine the solids content of this blend using ASTM D524. Two samples of the blend weighing approximately 15 g each should be analyzed. The results of this analysis gives the initial solids content of the material to be centrifuged. The blended samples shall be centrifuged as specified in 4.3.10.3.

4.3.10.3 Centrifuge test procedure. The centrifuging shall be conducted in a machine which allows the tubes to swing in a horizontal position at a speed of 2,000 rpm  $\pm$  50 rpm with a diameter of swing (tip to tip of whirling tubes) of 14 in to 17 in. The centrifuge head shall carry tubes of 15 ml capacity with tapered bottoms. Two centrifuge tubes shall be filled with the samples prepared as specified in 4.3.10.1 and 4.3.10.2 to a depth of 4 inches and adjusted to 21° C. The tubes are centrifuged for 11 minutes. After this treatment, decant the supernatant liquid from the tubes into tared beakers, pouring out only that which flows quickly, the whole operation not to require more than 30 seconds. Weigh the decanted material and analyze in

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accordance with ASTM D524. Calculate the percent solids in suspension after centrifuging as follows:

Grade A:

Percent solids in suspension after centrifuging =  $\frac{\text{percent solids after centrifuging}}{\text{percent solids before centrifuging}} \times 100$

Grade B and C:

Percent solids in suspension after centrifuging =  $\frac{\text{percent solids after centrifuging}}{\text{percent solids in blend before centrifuging}} \times 100$

4.3.11 Particle size, grades A and B. The particle size shall be determined on grade A lubricant as received; and on grade B, by blending one part of grade B lubricant with 49 parts of the oil specified in 4.3.9.1. The samples shall be thoroughly stirred to insure uniformity.

4.3.11.1 Particle size test procedure. A drop of the sample prepared as specified in 4.3.11, is placed on a glass microscopic slide using the utmost care to avoid contamination of the product, slides, or cover glass, with foreign material picked up in normal surroundings. The particle size is determined by taking a photomicrograph of the particles followed by measurement on the print, or by direct measurement using a metallographic microscope. A magnification of exactly 1000 diameters shall be used.

## 5. PACKAGING

5.1 Packaging. 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.

## 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 lubricants are considered military unique since the majority of use is on gun barrel/gun slide bearing assemblies associated with Navy guns. The use of the lubricants are critical to affecting the accuracy of the guns. The requirements of the lubricants, that impact the performance of the lubricants, are not commercially available. General descriptions of varying uses for each of grades A, B, and C are specified in 6.1.1, 6.1.2, and 6.1.3.

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6.1.1 Grade A. Grade A lubricant is suitable for the lubrication of machine gun housing guides, windshield wipers, and other lightly loaded sliding members exposed to the weather for both low and elevated temperatures.

6.1.2 Grade B. Grade B lubricant is suitable for the lubrication of gear trains of torpedoes.

6.1.3 Grade C. Grade C lubricant is suitable for the lubrication of medium or heavy duty gun slides without causing excessive resistance to counter recoil at ambient temperatures down to -23 °C. It should retain sufficient lubricating properties to permit free recoil and counter recoil when the gun is heated as a result of sustained fire.

6.1.4 Warming. The lubricant will not be used if there is a corrosion concern and should never be used where dissimilar metals are present.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification
- b. Grade and size required (see 1.2)
- c. Conformance inspection (see 4.2)
- d. Packaging requirements (see 5.1)

6.3 Subject term (key word) listing.

Gear train  
Gun barrel/gun slide bearing assemblies  
Ordnance  
Recoil

6.4 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.

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 materiel quality storage standard for type II (extendible) shelf-life items, and a minimum of 85 percent shelf-life remaining at time of receipt by the Government. These and other requirements, if necessary, are in DODM 4140.27 VOL 1, DoD Shelf-life Management Program: Program Administration, and DODM 4140.27 VOL 2, DoD Shelf-Life Management Program: Materiel Quality Control Storage Standards. The shelf-life codes are in the Federal Logistics Information System Total Item Record. Additive information for shelf-life management may be obtained from DoDM 4140.27 Volumes 1 and 2, 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

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POCs for the DoD Shelf-Life Program can be contacted through the DoD Shelf-Life Program website: <https://www.shelflife.dla.mil/>.

Custodians:

Navy – OS  
Army – CR4  
Air Force – 68

Preparing Activity:

DLA - GS-3

Project: (9150-2018-008)

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>