

MIL-G-48771 (PA)
19 June 1975

MILITARY SPECIFICATION
GRAPHITE - SPECIAL PURPOSE
(FOR USE IN AMMUNITION)

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

1. SCOPE

1.1 This specification covers one grade of Graphite for use in lithium reserve type batteries (see 6.3).

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

MILITARY

MIL-A-48076 - Ammunition, Standard Quality Assurance Provisions, General Specification For

STANDARDS

MILITARY

MIL-STD-129 - Marking for Shipping and Storage

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement function should be obtained from the procuring 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. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

FSC: 6810

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AMERICAN SOCIETY FOR TESTING AND MATERIALS

- ASTM-E300 - Sampling Industrial Chemicals
- ASTM-B329 - Apparent Density of Refractory Metals and Compounds by the Scott Volumeter
- ASTM-B330 - Average Particle Size of Refractory Metals and Compounds by Fisher Sub-sieve Sizer
- ASTM-D1553 - Graphites Used as Lubricants, Analysis of

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

3. REQUIREMENTS

3.1 Material.-The material shall be natural crystalline graphite conforming to the following requirements:

3.1.1 Form.-The material shall be a powder type, appearing steel gray or dull gray in color and shall be free of dirt, chips, grease and other foreign matter when examined as specified in 4.4.3.1.

3.1.2 Properties.-The graphite shall conform with the following properties when tested in accordance with the applicable test paragraph.

<u>Property</u>	<u>Requirement</u>	<u>Applicable Test Paragraph</u>
Carbon, % min	97.0	4.4.3.2
Ash Content, % max	3.0	4.4.3.2
Moisture & Volatiles, % max	0.3	4.4.3.3
Average Particle Size, Fisher Reading	0.76 to 0.84 (see 6.4)	4.4.3.4
Apparent Density, g/in ³	1.38 to 1.52 (see 6.4)	4.4.3.5

3.2 First article testing. This specification makes provisions for first article testing. Requirements for the submission of first article samples by the contractor shall be as specified in the contract. (see 6.1)

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4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection and Standard Quality Provisions. Unless otherwise specified herein or in the contract, the provisions of MIL-A-48078 shall apply and are hereby made a part of this detail specification.

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

- a. First Article Inspection (see 4.3)
- b. Quality Conformance Inspection (see 4.4)

4.3 First article inspection

4.3.1 Submission. The contractor shall submit a first article sample as designated by the Contracting Officer for evaluation in accordance with provisions of 4.3.2. The first article shall consist of 2 pounds of graphite obtained by sampling as described in 4.4.2.1. The sample shall be obtained from a production lot which has been produced by the contractor using the same production processes, procedures and equipment as will be used in fulfilling the contract. All materials, shall be obtained from the same sources of supply as will be used in regular production.

4.3.2 Inspections to be performed.-The sample will be subjected by the Government to any or all of the examinations or tests specified in 4.4.3 of this specification.

4.3.3 Rejection.-See MIL-A-48078 (PA)

4.4 Quality Conformance Inspection

4.4.1 Lot formation.-A lot shall consist of one or more batches of graphite produced by one manufacturer, in accordance with the same specification, or same specification revision, under one continuous set of operating conditions. Each lot shall consist of that quantity of graphite that has been subjected to the same unit chemical or physical mixing process intended to make the final product homogeneous. The product shall be submitted for inspection in accordance with MIL-STD-105.

4.4.2 Testing

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4.4.2.1 Sampling.-Approximately 1 pound of graphite shall be withdrawn from each batch to be sampled using ASTM Procedure E300-70 for solids. Samples shall be selected for inspection in accordance with MIL-STD-1235, CSP-1 Plan, Inspection Level II, AQL 6.5%. If any sample fails to meet any test requirement the batch represented by the sample shall be rejected. All batches produced between the time that the last batch was tested and accepted and the batch which failed should be tested in accordance with the applicable methods given in paragraph 4.4.3. If any of these batches fail to meet any of the test requirements, that batch shall also, be rejected. In addition, after any failure of a batch the contractor will return to 100% inspection until "1" successive batches are accepted as required by MIL-STD-1235. The samples shall be subjected to the tests listed below: (see 6.5)

Inspection/Requirement	Defect Classification
Form (see 3.1.1)	Major B
Carbon (see 3.1.2)	Major B
Moisture and Volatiles (see 3.1.2)	Major B
Particle Size (see 3.1.2)	Major B
Scott Volumetry	Major B
Ash (see 3.1.2)	Major B

4.4.2.2 Inspection Equipment.-The government reserves the right to inspect the contractor's equipment and determined that he has available and utilizes correctly, measuring and test equipment of the required accuracy and precision and that the instruments are of the proper type and range to make measurements of the required accuracy. Commercial inspection equipment, shall be employed where applicable for all tests and examinations specified in 4.4.3. The contractor is responsible for assuring proper calibration procedures are followed. Government approval of inspection equipment is required prior to its use for acceptance purpose.

4.4.3 Test methods and procedures.-(see 6.2) The tests in 4.4.3.1 thru 4.4.3.5 shall be performed using prescribed analytical procedures for replicate determinations given in standard analytical textbooks.

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4.4.3.1 Form-Spread approximately 1/8 pound of the sample on a flat surface and examine the material visually for the presence of contamination and form.

4.4.3.2 Carbon.-The carbon content of the sample shall be performed in accordance with the Incineration Ash Method described in ASTM-D1553. The percent carbon shall be calculated as follows after determining the ash content:

$$\% \text{ Carbon} = 100\% - \% \text{ Incineration Ash Found}$$

4.4.3.3 Moisture and Volatiles.-Determine the volatile matter in accordance with the method described in ASTM-D1553 for Volatile Matter.

4.4.3.4 Average Particle Size.-Determine the average particle size in accordance with the method described in ASTM-B330 except that the sample shall be packed by a force of 15 inch pounds applied by turning the pinion knob with a torque wrench or screw driver.

4.4.3.5 Apparent Density.-Determine the apparent density of the material in accordance with the method described in ASTM-B329.

5. PREPARATION FOR DELIVERY

5.1 Packing

5.1.1 Level A and Level C.-Unless otherwise specified, the graphite shall be packed in accordance with manufacturer's commercial practice to assure acceptance by common carrier for safe delivery at first destination for immediate use.

5.2 Marking.-Unless otherwise specified, the shipping containers shall be marked in accordance with MIL-STD-129, and shall include the lot number.

6. NOTES

6.1 Ordering data.-See MIL-A-48078 (FA)

6.2 Prior approval of the Contracting Officer is required for use of equivalent test methods. A description of the proposed method should be submitted thru the Contracting Officer to: Commander, ATTN: SARPA-QA-A-P, Picatinny Arsenal, Dover, New Jersey 07801. This description should include but not be limited to the procedures used, the accuracy and precision of the method, test data to demonstrate the accuracy and precision and drawings of any special equipment required.

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6.3 Graphite which has been found satisfactory for use in lithium batteries is manufactured by Joseph Dixon Crucible Company, Wayne and Monmouth Streets, Jersey City, N.J. 07303. Graphite from other sources shall be evaluated by Picatinny Arsenal, Dover, N.J. 07801 (ATTN: SARPA-QA-A-M) before being approved as an equivalent.

6.4 These values are applicable to the material at point of manufacture before packing. These values change after material has been packaged and shipped.

6.5 A 100 gram sample of the graphite should be retained by the supplier for a minimum of 120 days after processing in order to verify average particle size and apparent density.

Custodian:
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Preparing Activity:
Army-PA

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ATTN: SARPA-QA-A
Dover, New Jersey 07801

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