

INCH-POUND

MIL-DTL-18618B(OS)

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SUPERSEDING

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DETAIL SPECIFICATION

LEAD CARBONATE, BASIC, DRY (FOR ORDNANCE USE)

This specification is approved for use by the Naval Sea Systems Command and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers dry basic lead carbonate for ordnance use in propellant powders.

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 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.

INTERNATIONAL STANDARDIZATION AGREEMENTS

STANAG 4147 - Chemical Compatibility of Ammunition Components with Explosives
(Non-Nuclear Applications)

(Copies of this document are available online at <http://quicksearch.dla.mil>.)

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.

ASTM INTERNATIONAL

ASTM D185 - Standard Test Methods for Coarse Particles in Pigments
ASTM D280 - Standard Test Methods for Hygroscopic Moisture (and Other Matter Volatile Under the Test Conditions) in Pigments
ASTM D1301 - Standard Test Methods for Chemical Analysis of White Lead Pigments

(Copies of these documents are available online at www.astm.org.)

Comments, suggestions, or questions on this document should be addressed to: Commander, Naval Sea Systems Command, ATTN: SEA 05S, 1333 Isaac Hull Avenue, SE, Stop 5160, Washington Navy Yard DC 20376-5160 or emailed to CommandStandards@navy.mil, with the subject line "Document Comment". 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>.

MIL-DTL-18618B(OS)

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. The material shall be a high-grade basic carbonate white lead and shall contain no more than traces of impurities (see [table I](#)) incident to well-controlled manufacture of this material.

3.1.1 Chemical composition. The material shall conform to the chemical requirements specified in [table I](#) (see 4.2.1 for test methods).

TABLE I. Chemical requirements.

Requirements	Minimum	Maximum
Impurities	-	0.5%
Lead carbonate	62%	69%
Total lead (calculated as Pb)	80%	-
Moisture	-	0.7%

3.1.2 Physical properties. All primary samples shall conform to the physical requirements specified in [table II](#) (see 4.2.2).

TABLE II. Physical properties.

Requirements	Minimum	Maximum
Average particle size	-	5 microns
Percent coarse particles	-	0.5%

3.1.3 pH value. All primary samples shall have a pH value between 5.5 and 7.0 (see 4.2.3).

3.1.4 Compatibility. When subjected to a compatibility test (see 4.2.4 and 6.4), the delta shall not exceed a value of 4 °C as specified in NATO STANAG 4147.

4. VERIFICATION

4.1 Conformance inspection. Conformance inspection shall consist of the examinations and tests of 4.2 and [table III](#). Failure of any sample to conform to any requirement specified herein shall be cause for rejection of the lot represented. If alternate methods and test procedures are used, prior written approval shall be obtained as specified (see 6.2).

MIL-DTL-18618B(OS)

TABLE III. Conformance inspection.

Test or Examination	Requirement	Test Method
Insoluble impurities	3.1.1	4.2.1.1
Lead carbonate	3.1.1	4.2.1.2
Total lead	3.1.1	4.2.1.3
Moisture	3.1.1	4.2.1.4
Average particle size	3.1.2	4.2.2.1
Percent coarse particles	3.1.2	4.2.2.2
pH value	3.1.3	4.2.3
Compatibility	3.1.4	4.2.4

4.1.1 Lot. A lot shall consist of 5,000 pounds (or less) of material manufactured as part of one batch or under uniform process conditions.

4.1.2 Sampling. A minimum of five containers in the lot shall be selected in a random manner so as to be representative of the lot.

4.1.2.1 Primary samples. From each selected container in 4.1.2, a primary sample of 1.5 pounds shall be removed by means of a scoop.

4.1.2.2 Subsamples. Each primary sample in 4.1.2.1 shall be subdivided into three subsamples of 8 ounces each. The first and second subsamples from each container shall be placed in separate rubber stoppered bottles and labeled to show:

- a. Name of material
- b. Manufacturer
- c. Plant
- d. Contract or purchase order number
- e. Lot number
- f. Identification of container from which the sample was taken

4.1.2.3 Composite samples. The remaining 8-ounce subsamples in 4.1.2.2 shall be thoroughly mixed together and separated into two approximately equal composite samples. Each composite sample shall be placed in a rubber stoppered bottle and labeled to show:

- a. Name of material
- b. Manufacturer
- c. Plant
- d. Contract or purchase order number
- e. Number of pounds in the lot
- f. Lot number

4.1.2.4 Test samples. The five bottles containing the first subsamples from each container and one bottle of the composite sample shall be forwarded for analysis, as specified (see 6.2). Each of the forwarded primary samples shall be for use in testing conformity to the requirements for physical properties, pH, and compatibility. The forwarded composite sample shall be for use in the chemical analysis.

4.1.3 Inspection facilities. Inspection facilities shall be as specified (see 6.2).

MIL-DTL-18618B(OS)

4.2 Test procedures.

4.2.1 Chemical composition. Analysis for chemical composition shall be carried out on the composite sample in accordance with the following test procedures.

4.2.1.1 Insoluble impurities. Insoluble impurities shall be determined in accordance with ASTM D1301.

4.2.1.2 Lead carbonate. Lead carbonate shall be determined in accordance with ASTM D1301, using the evolution method for determining CO₂.

4.2.1.3 Total lead. Total lead shall be determined in accordance with ASTM D1301, using the factor 0.641 for converting lead chromate to lead.

4.2.1.4 Moisture. Moisture shall be determined in accordance with ASTM D280.

4.2.2 Physical properties. Analysis for physical properties shall be carried out on the primary sample in accordance with the following.

4.2.2.1 Average particle size. The average particle size shall be determined separately on each primary sample using the Fisher Sub-Sieve Sizer, or equal. A sample of 6.14±0.01 grams (g) (approximately 1 milliliter [mL] by volume) shall be used. All operations shall be performed in accordance with the instructions supplied with the instrument.

4.2.2.2 Percent coarse particles. Each primary sample shall be tested in accordance with ASTM D185, using a No. 325 U.S. standard sieve.

4.2.3 pH value. The pH value shall be determined by performing the following procedure:

- a. Prepare a quantity of carbon dioxide-free water by boiling distilled water in a 1-liter flask for 15 minutes.
- b. Close the flask with an "Ascarite" (or similar CO₂ absorbent material) guard tube and cool to 25 °C.
- c. Check the pH of the water at 25±1 °C to determine that its value lies between 6.0 and 7.0.
- d. Transfer 10±0.01 grams of a primary sample of the basic lead carbonate to a 250-milliliter flask equipped with a ground-glass stopper.
- e. Add 100 milliliters of the prepared water, stopper the flask, and shake for 1 minute.
- f. Allow the flask and contents to stand for 1 hour, at 25±1 °C, with occasional swirling.
- g. Allow the sample to settle.
- h. Decant a portion of the supernatant liquid.
- i. Determine the pH of the liquid at 25±1 °C by means of a calibrated potentiometer equipped with a glass electrode and a saturated calomel reference electrode.
- j. Repeat or concurrently perform this procedure for each primary sample submitted as representative of the lot.

4.2.4 Compatibility test. Each primary sample in 4.1.2.1 shall be subjected to the Differential Scanning Calorimetry (DSC) test as specified in NATO STANAG 4147. Each primary sample shall be tested separately, but the tests can be run concurrently if facilities permit. Uniform instrumental conditions, setup conditions, and calibration materials must be used if more than one instrument is used. The explosives and test materials shall be as specified (see 6.2 and 6.4). If the results of the test are inconclusive, the path forward shall be determined by the government technical agent.

MIL-DTL-18618B(OS)

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. Lead carbonate is used in the propellant formulation for naval artillery gun propelling charges to act as a de-coppering agent.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. If required, the specific issue of individual documents referenced (see 2.2 and 2.3).
- c. Alternate test methods for conformance inspection when appropriate (see 4.1).
- d. Requirement for the submission and retention of test samples (see 4.1.2.4).
- e. Requirements for inspection facilities (see 4.1.3).
- f. Circumstances or criteria leading to Government desire to perform testing (see 4.1.3).
- g. Explosives and test materials (see 4.2.4 and 6.4).
- h. Packaging requirements and special markings (see 5.1 and 6.5).

6.3 Material. Under 3.1, the material is described chemically as basic lead carbonate with a lead carbonate content of 62 to 69 percent. The remainder (other than impurities and moisture) is generally all lead hydroxide or various proportions of lead hydroxide and anhydrous lead oxide combined in the compound. Thus, the material "basic lead carbonate" covered by this specification is high-grade commercial "white lead" with a lead carbonate content and ratio of lead carbonate to lead hydroxide complying with the requirements of 3.1.

6.4 Compatibility test. The DSC test described in 4.2.4 is intended to determine whether any undesirable interaction occurs between the material and the explosive. For the DSC test in NATO STANAG 4147, lead carbonate should be designated the test material and the propellant powder that will contain the tested lead carbonate should act as the explosive. Previous tests have indicated that high-grade commercial pigment "basic carbonate white lead" will readily pass this test. Prime manufacturers are advised that compatibility tests will be conducted at Government laboratories. Information regarding testing of samples for conformance to the compatibility requirement prior to submission of bids may be obtained from the Commanding Officer, Indian Head Explosive Ordnance Disposal Technology Division, Indian Head, MD 20640.

6.5 Packaging.

6.5.1 Suggested packaging. Packaging requirements are as specified (see 6.2). It is recommended that basic lead carbonate be packaged in 50-pound containers conforming to standard commercial practice for the pigment "basic carbonate white lead."

MIL-DTL-18618B(OS)

6.5.2 Suggested marking. Marking requirements are as specified (see 6.2). It is recommended that each container be plainly marked with the following information:

- a. Material
- b. Specification
- c. Stock No.
- d. Quantity
- e. Contractor
- f. Manufacturer
- g. Contract No.
- h. Gross Weight
- i. Date
- j. Lot No.

In addition to the forgoing, shipments should be marked in accordance with the requirements of MIL-STD-129.

6.6 Subject term (key word) listing.

De-coppering agent

Lead hydroxide

6.7 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.

Custodian:
Navy – OS

Preparing activity:
Navy – OS
(Project 6810-2015-014)

Review activity:
DLA – GS

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