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SUPERSEDING
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MILITARY SPECIFICATION

BARIUM CARBONATE (For Use in Ammunition)

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

1. SCOPE

1.1 This specification covers barium carbonate for use in ammunition.

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

FEDERAL

RR-S-366 - Sieves, Test

STANDARD

MILITARY

MIL-STD-129 - Marking for Shipment and Storage

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

FSC 6810

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2.2 Other publications. The following document forms 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.

AMERICAN SOCIETY FOR TESTING AND MATERIALS

ASTM D-1193-66 - Specification for Reagent Water

(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 barium carbonate shall be a white powder product of high quality suitable for the purpose intended, and so formulated as to meet the requirements specified herein.

3.2 Chemical and physical properties. The chemical and physical properties of barium carbonate shall conform to the requirements shown in table I.

Table I. Chemical and physical requirements

Property	Requirement	Test par.
Acid-insoluble matter, percent, max.	0.2	4.5.3
Barium, percent, min.	68.0	4.5.4
Moisture, percent, max.	0.3	4.5.5
Alkalinity (as sodium carbonate), percent, max.	0.5	4.5.6
Apparent density, gm. per ml., min.	2.2	4.5.7

3.3 Granulation. The barium carbonate shall conform to the granulation of table II, when tested as indicated in 4.5.8.

Table II. Granulation requirements

Through Sieve No.	Percent, min.
50	99
200	85

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4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier 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 supplies and services conform to prescribed requirements.

4.2 Lot size. An inspection lot shall consist of not more than 10,000 pounds of barium carbonate. If the material is produced by a continuous run process, the lot shall contain material from only one continuous run. Material in the inspection lot shall be identified by order or production (in the case of a continuous run process), or by a batch number (in the case of a batch process) until final action is taken on the acceptance or rejection of the lot.

4.3 Sampling. The inspector shall take three separate 1 pound samples from the lot. If the material was produced in batches, each sample shall be taken from a different batch, if possible. If the material was produced in one continuous run, the three samples shall be taken as follows: one from the first part; one from the middle part; and one from the last part of the run. Each sample shall be placed in a clean, dry, metal or glass container which shall be sealed and carefully marked.

4.4 Lot acceptance. Each of the three samples, as selected in 4.3, shall be subjected to all the tests specified in 4.5. If any sample is found to be not in conformance with the requirements of this specification, the lot represented shall be rejected.

4.5 Test methods.

4.5.1 General. Distilled water, in accordance with ASTM D1193 and analytical grade reagents, shall be used throughout the test. Blank determinations shall be run in parallel with the tests, using the same quantities of reagents used in the test and corrections shall be applied when necessary.

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4.5.2 Color. Determine by visual inspection.

4.5.3 Acid-insoluble matter. Transfer a 5 gm. sample, weighed to 0.1 mg., to a 400 ml. beaker. Add 200 ml. of dilute hydrochloric acid (10 percent), bring to boiling, and boil until decomposition of carbonate is complete. Filter through a Whatman No. 40 filter paper, and transfer and wash with water. Retain the filtrate for the determination of barium as described in 4.5.4. Transfer the filter paper and residue to a tared crucible. Char and burn off the filter paper at dull red heat, and then ignite at red heat for 30 minutes. Cool in a desiccator and weigh. Calculate the percent acid-insoluble matter as follows:

$$\text{Percent acid-insoluble matter} = \frac{100A}{W}$$

where: A = gm. of precipitate
W = gm. of sample

4.5.4 Barium. Transfer the filtrate from the determination of acid-insoluble matter to a 500 ml. volumetric flask and dilute to the mark with water. Pipet a 50 ml. aliquot into a 400 ml. beaker and dilute to about 225 ml. with water. Add 6 ml. of hydrochloric acid and heat to about 80°C. While stirring, add 10 ml. of ammonium acetate solution (40 percent), 25 ml. of potassium dichromate solution (10 percent) and 10 gm. of reagent grade urea. Cover with a watch glass, heat to boiling and boil moderately until a precipitate settles on the bottom of the beaker (this will take about 20 to 30 minutes), then continue to boil moderately for 90 minutes. Midway during the 90 minute boiling period, wash down the cover glass with water and add sufficient hot water to bring up the volume to about 250 ml. At the end of the heating period, filter the solution (while hot) through a tared sintered glass crucible of fine porosity. Transfer the precipitate to the crucible with potassium dichromate wash solution (made by diluting 50 ml. of 10 percent potassium dichromate solution to 1 liter with water) and finally wash the precipitate four times with water. Dry the crucible at 120°C for 1 hour, cool in a desiccator and weigh. Calculate the percent barium as follows:

$$\text{Percent barium} = \frac{54.21A}{W}$$

where: A = weight of precipitate, gm.
W = weight of sample, in aliquot, gm.

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4.5.5 Moisture. Transfer a 5 gm. sample, weighed to 0.01 gm. to a weighing dish (60 mm in diameter) and weigh the dish plus sample to 0.1 mg. Heat at 125°C for 3 hours, cool in a desiccator, and weigh to 0.1 mg. Evaluate the percent moisture as follows:

$$\text{Percent moisture} = \frac{100A}{W}$$

where: A = gm. loss in weight
W = gm. of sample

4.5.6 Alkalinity (as sodium carbonate). Transfer a 10 gram sample, weighed to 0.01 gm., to a 250 ml. beaker and add 50 ml. of water. Stir for approximately 5 minutes. Filter through a Whatman No. 40 filter paper and wash with 50 ml. of water. Titrate the combined filtrate and washings with approximately 0.1N HCl using methyl orange indicator. Calculate any alkalinity to percent sodium carbonate as follows:

$$\text{Percent alkalinity (as sodium carbonate)} = \frac{5.3 VN}{W}$$

where: V = ml. of standard acid used in titration
N = normality of standard acid used
W = gm. of sample

4.5.7 Apparent density. Transfer a 30 gm. sample, weighed to 0.01 g., to a stoppered glass cylinder approximately 6 inches high, with an internal diameter of 0.8 inch, and graduated in divisions of 0.5 ml. Drop the cylinder vertically 30 times from a height of 2.5 inches, permitting the base to strike against a hard leather pad. Level off the surface of the column of barium carbonate with a minimum of tapping on the side of the cylinder, and note the volume occupied by the barium carbonate. Calculate the apparent density of the sample by dividing the weight by the volume occupied. CAUTION: Avoid the warming of the cylinder by contact with the hands as this may affect the accuracy of the result

4.5.8 Granulation. Place an accurately weighed sample (approximately 100 gm.) on the specified sieves, conforming to RR-S-366, properly superimposed and assembled with a bottom pan. Add 2 metal disks about 1/2 inch in diameter, 1/16 inch thick, each weighing approximately 6 gm. Cover the assembly and subject it to a 5 minute shaking treatment which involves 300 ± 15 gyrations and 150 ± 10 taps per minute. Weigh the portions retained or passed by the various sieves as required, and calculate the results to a percentage basis.

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5. PREPARATION FOR DELIVERY

5.1 Packing. Barium carbonate shall be packed in steel kegs, steel drums or steel pails of the type, size and kind commonly used for the purpose and so constructed as to insure acceptance and safe delivery by the common or other carrier, at the lowest rate, to the point of delivery.

5.2 Marking. In addition to any special marking required by the contract or order, shipments shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use. Barium carbonate covered by this specification is intended for use in inert loading or practice shell.

6.2 Ordering data. Procurement documents should specify the following

- (a) Title, number and date of this specification.
- (b) Packing required (see 5.1).
- (c) Unit quantity required.

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

Custodian:

Army - MU
Navy - OS

Preparing activity:

Army - MU
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