

MIL-B-550A

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SUPERSEDING

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MILITARY SPECIFICATION**BARIUM CHROMATE**

This specification has been approved by the Department of Defense and is mandatory for use by the Departments of the Army, the Navy, and the Air Force.

1. SCOPE

1.1 This specification covers barium chromate in crystalline powder form.

1.2 Classification. The barium chromate shall be of the following grades, as specified (see 6.2):

Grade A.

Grade B.

2. APPLICABLE DOCUMENTS

2.1 The following specifications and standards, of the issue in effect on date of invitation for bids, form a part of this specification:

SPECIFICATIONS**FEDERAL**

RR-S-366 — Sieves, Standard, for Testing Purposes.

UU-P-236 — Paper, Filter, Analytical.

UU-S-48 — Sacks, Paper, Shipping.

STANDARDS**MILITARY**

MIL-STD-105 — Sampling Procedures and Tables for Inspection by Attributes.

MIL-STD-129 — Marking for Shipment and Storage.

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions 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. Unless otherwise indicated, the issue in effect on date of invitation for bids shall apply.

INTERSTATE COMMERCE COMMISSION

49 CFR 71-78 — Interstate Commerce Commission Rules and Regulations for the Transportation of Explosives and other Dangerous Articles.

(The Interstate Commerce Commission regulations are now a part of the Code of Federal Regulations (1949 Edition — Revised 1950) available

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from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Orders for the above publication should cite "49 CFR 71-78 (Rev. 1950)."

**CONSOLIDATED CLASSIFICATION
COMMITTEE**

Uniform Freight Classification Rules.

(Application for copies of these freight classifi-

cation rules should be addressed to the Consolidated Classification Committee, 202 Chicago Union Station, Chicago 6, Ill.)

3. REQUIREMENTS

3.1 The material shall conform to the requirements shown in table I.

TABLE I. *Requirements*

| Requirement | Grade A | | Grade B | | Test method |
|--|---------|------|---------|-------|-------------|
| | Min. | Max. | Min. | Max. | |
| Volatile matter, percent | ... | 0.10 | ... | 0.20 | 4.3.1 |
| Barium chromate, percent | 98.5 | ... | 99.0 | ... | 4.3.2 |
| Chlorides (as Cl), percent | ... | 0.05 | ... | 0.05 | 4.3.3 |
| Water soluble matter, percent | ... | 0.05 | ... | 0.08 | 4.3.4 |
| Moisture reabsorption, percent | ... | ... | ... | 0.20 | 4.3.5 |
| Apparent density (gm/ml) | 0.35 | 0.50 | 0.35 | 0.75 | 4.3.6 |
| Granulation, percent: | | | | | 4.3.7 |
| Through 190-micron (No. 100) sieve. ... | ... | ... | 100.0 | | |
| Through 74-micron (No. 200) sieve. ... | ... | ... | 98.0 | | |
| Through 44-micron (No. 325) sieve. ... | 100.0 | | | | |
| Average particle diameter (microns) | ... | 2 | ... | - 3.5 | 4.3.8 |

4. QUALITY ASSURANCE PROVISIONS

4.1 Unless otherwise specified herein the supplier is responsible for the performance of all inspection requirements prior to submission for Government inspection and acceptance. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. Inspection records of the examination and tests shall be kept complete and available to the Government as specified in the contract or order.

4.2 Inspection provisions.

4.2.1 *Lotting.* A lot shall consist of that quantity of barium chromate produced by one manufacturer in not more than 24 consecutive hours under essentially the same manufacturing conditions and with no change in materials, provided the operation is continuous. In the event that the process is a batch operation, each batch shall constitute a lot.

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

4.2.2 Sampling.

4.2.2.1 *For examination.* Sampling shall be conducted in accordance with Standard MIL-STD-105.

4.2.2.2 *For test.* A sample shall be taken from each lot, the size to be calculated on the basis of one-tenth of the square root of the number of containers in the lot raised to the next highest whole number. If there are fewer than three containers in a lot, each container shall be sampled. In all other cases, no fewer than three containers shall be selected. From each container in the sample a representative one pound specimen shall be taken and placed in separate, clean, dry containers which are labeled to

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identify the lot and container represented.

4.2.3 Examination.

4.2.3.1 *Nondestructive.* Each lot shall be inspected in accordance with the classification of defects and Standard MIL-STD-105.

4.2.3.2 *Test.* Equal portions of each specimen selected in accordance with 4.2.2.2 shall be thoroughly mixed to form a composite specimen. The composite specimen shall be subjected to the test specified in 4.3.

4.2.3.3 Classification of defects.

4.2.3.3.1 *Preparation for delivery.* (Level A only.)

Categories and defects

Major AQL 4.0 percent defective

1. Container damaged.
2. Container leakage.
3. Container closure incorrect.
4. Container incorrect.
5. Marking incorrect, missing or illegible.

4.3 Tests. Distilled water and analytical reagent grade chemicals shall be used throughout the test. Where applicable a blank determination shall be run and corrections applied where significant.

4.3.1 *Volatile matter.* Heat a glass-stoppered moisture dish in an oven at 100° to 110°C. for 1 hour, cool in a desiccator, and weigh to the nearest 0.1 milligram (mg.). Transfer approximately 2 grams (gm.) of the specimen to the dry dish, stopper and weigh. Heat unstoppered in an oven at 100° to 110°C. for 1 hour, cool in a desiccator, replace the stopper, and weigh to the nearest 0.1 mg. Repeat the heating for half-hour periods until successive weighings differ by not more than 0.2 mg. Calculate the loss in weight as percent volatile matter as follows:

$$\text{Percent volatile matter} = 100 \times \frac{A - B}{A - D}$$

where:

A = weight of original specimen and dish, in gm.

B = weight of specimen and dish after drying to constant weight, in gm.

D = weight of dry moisture dish, in gm.

4.3.2 Purity.

4.3.2.1 *Starch indicator solution.* Mix 1 gm. of soluble starch with 10 gm. of red mercuric iodide and enough cold water to make a thin paste, add 200 milliliters (ml.) of boiling water and boil about 1 minute while stirring. Cool before use.

4.3.2.2 *Procedure.* Weigh to the nearest 0.1 mg. approximately 0.35 gm. of the specimen and transfer to a 500-ml. Erlenmeyer flask. Add 75 ml. of water plus 15 ml. of concentrated hydrochloric acid to dissolve the specimen. Add about 2 gm. of powdered sodium carbonate in small portions to the sample solution with constant swirling. Dissolve 10 gm. of iodate-free potassium iodide in 10 ml. of water and add to the specimen solution. Swirl to mix, cover the flask with a watch glass to exclude air, and put in a dark place for 10 minutes. Dilute to about 350 ml. with water and titrate with 0.1 N sodium thiosulfate solution until the brown color of the liberated iodine begins to fade. Add 3 to 5 ml. starch indicator solution (see 4.3.2.1) and complete the titration. At the end point, the blue color of the starch iodine disappears and leaves the green color of the chromic ion. Calculate the percent of barium chromate on a volatile matter-free basis as follows:

$$\text{Percent barium chromate} = \frac{8.446 \times V \times N}{W \times (1 - 0.01 \times A)}$$

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where:

V = volume of standard sodium thio-sulfate solution used, in ml.

N = normality of standard sodium thiosulfate solution.

W = weight of specimen used, in gm.

A = percent of volatile matter in the sample (see 4.3.1).

4.3.3 *Chlorides*. Weight to the nearest milligram approximately 10 gm. of the specimen and transfer to a 500-ml. Erlenmeyer flask. Add 250 ml. of water and shake thoroughly. Add a small amount of filter paper pulp and filter the solution through filter paper conforming to type II, class 6 of Specification UU-P-236 into a 600-ml. beaker. Wash the residue with several portions of water and add the washings to the filtrate. Add 1 ml. of a 5-percent solution of potassium chromate to the filtrate and titrate with 0.1 N silver nitrate solution to a permanent faint blood-red tinge. Run a blank. Calculate the percent of chlorides as follows:

Percent chlorides =

$$\frac{3.55 \times (V - B) \times N}{W}$$

where:

V = volume of standard silver nitrate solution used for the sample, in ml.

B = volume of standard silver nitrate solution used for for blank, in ml.

N = normality of silver nitrate solution.

W = weight of specimen used, in gms.

4.3.4 *Water soluble matter*.

4.3.4.1 *Preparation of saturated barium chromate solution*. Place approximately 2 gm. of barium chromate in a 600-ml. beaker,

add 500 ml. of water, and boil for 5 minutes. Filter the solution through filter paper conforming to type II, class 6 of Specification UU-P-236. Wash the residue with hot water and transfer to a clean 500-ml. beaker, add 500-ml. hot water, and boil for 5 minutes. Cool to room temperature and filter the solution through filter paper conforming to type II, class 6 of Specification UU-P-236, refiltering if necessary to obtain a clear filtrate.

4.3.4.2 *Correction for saturated barium chromate solution*. Dry a 100-ml. beaker at 100° to 105°C. for 1 hour, cool in a desiccator, and weigh to the nearest 0.1 mg. Measure 60 ml. of the saturated barium chromate solution prepared in 4.3.4.1 and transfer to the weighed beaker. Evaporate to dryness on a steam bath. The liquid may be evaporated on a hotplate to a volume of approximately 2 ml. if care is taken to prevent mechanical loss, and the evaporation is then completed on a steam bath. Dry the beaker and contents for 1 hour at 100° to 105°C., cool in a desiccator and weigh to the nearest 0.1 mg.

4.3.4.3 *Determination of water soluble matter*. Dry a 100-ml. beaker at 100° to 105°C. for 1 hour, cool in a desiccator, and weigh to the nearest 0.1 mg. Weigh approximately 5 gm. of the specimen and transfer to a 150-ml. beaker. Add 50 ml. of the saturated barium chromate solution prepared in 4.3.4.1, mark the level of the liquid in the beaker, cover with a watch-glass, and boil for 5 minutes. Cool the mixture to room temperature, add water to bring the volume to 50 ml., stir thoroughly, and filter the solution by decantation through filter paper conforming to type II, class 6 of Specification UU-P-236 into the weighed 100-ml. beaker. Refilter if necessary to obtain a clear solution. Wash the insoluble matter twice with 5-ml. portions of the saturated barium chromate solution. Evaporate the combined filtrate and washings as described in 4.3.4.2. Dry the beaker and con-

tents for 1 hour at 100° to 105°C., cool in a desiccator, and weigh to the nearest 0.1 mg. Calculate the percent of water soluble matter as follows:

$$\text{Percent water soluble matter} = \frac{100 \times (A - B)}{W}$$

where:

A = weight of residue from sample, in gm.

B = weight of residue from control (see 4.3.4.2), in gm.

W = weight of specimen taken, in gm.

4.3.5 Moisture reabsorption. Prepare a 27-percent solution of sulfuric acid by diluting 153 ml. of sulfuric acid (specific gravity 1.84) to 1 liter. Place the dried sample (see 4.3.1) in a desiccator containing the sulfuric acid solution for 24 ± 0.5 hours at $25^\circ \pm 1^\circ\text{C}$. Reweigh and calculate the percent increase as moisture reabsorption.

4.3.6 Apparent density. Weigh the receiving cube of a Scott Volumeter and assemble the apparatus with a 420-micron (No. 40) sieve conforming to the requirements of Specification RR-S-366 in the upper hopper so that the receiving cube is directly under the lower funnel and rests on the base of the apparatus. Using a quantity of the sample sufficient to fill the receiving cube to overflowing, slowly pour the material through the screen into the hopper. If necessary, brush the material through the screen with a camel's hair brush. By means of a straight-edged spatula, carefully scrape off the excess material from the top of the receiving cube. Care must be taken not to jar the apparatus during the procedure. Weigh the cube and contents. Calculate apparent density as follows:

$$\text{Apparent density} = \frac{W}{16.39}$$

where:

W = weight of specimen in the receiving cube, in gm.

Report the average of three determinations.

4.3.7 Granulation. Dry a watchglass at 100°C. to 105°C. for 20 minutes, cool in a desiccator, and weigh. Weigh approximately 100 gm. of the specimen and transfer to the specified sieve (see table I), conforming to Specification RR-S-366, which has been placed on an evaporating dish of about 9 inches in diameter. Wash the material through the sieve with water containing a small amount of a wetting agent. A camel's hair brush may be used to facilitate washing the particles through the screen. When no more material will pass through the sieve, wash the residue with acetone. Dry the residue in air, transfer it carefully to the weighed watchglass, dry at 100° to 105°C. for 20 minutes, cool in a desiccator, and weigh. Repeat the procedure for each sieve required (see table I) and calculate the percent of material passed through each sieve as follows:

$$\text{Granulation (percent through)} = \frac{A}{100 \left(1 - \frac{A}{W}\right)}$$

where:

A = weight of residue on sieve, in gm.

W = weight of specimen, in gm.

4.3.8 Particle size. The particle size shall be determined by means of a Fisher Sub-sieve Sizer, in accordance with manufacturer's instructions.

4.4 Rejection criteria. If composite specimen selected as specified in 4.2.3.2 fails to conform to this specification, the lot shall be rejected.

5. PREPARATION FOR DELIVERY

MIL-B-550A**5.1 Packing.**

5.1.1 Level A. Fifty pounds of barium chromate shall be packed in a new metal drum meeting the requirements of I.C.C. Specification 37A or in a 5-ply multiwall bag, style 2X, type optional, meeting the requirements of Specification UU-S-48.

5.1.2 Level B. Not applicable.

5.1.3 Level C. The barium chromate shall be packed in accordance with the manufacturer's commercial practice to afford protection against damage during direct shipment from the supply source to the first receiving activity for immediate use. Containers used shall comply with ICC Regulations, Uniform Freight Classification Regulations or other common carrier regulations applicable to the mode of transportation.

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

5.2.1 Precautionary marking. All individual containers shall be marked with the following precautionary marking:

CAUTION

Avoid inhalation of dust.

Avoid prolonged or repeated contact
tact with skin!

6. NOTES**6.1 Intended use.**

6.1.1 Grade A. Grade A barium chromate is intended for use in the manufacture of delay powder and other nongaseous powder.

6.1.2 Grade B. Grade B barium chromate is intended for use in pyrotechnic mixtures.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Grade required (see 3.1 and 6.1).
- (c) Selection of applicable level of packing.
- (d) In the case of level A packing, type of container required.

Notice. When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded, by implication or otherwise, as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Custodians:

Army—Chemical Corps
Navy—Bureau of Ordnance

Preparing activity:

Army—Chemical Corps