

MIL-Z-12061B
 24 March 1983
 SUPERSEDING
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MILITARY SPECIFICATION

ZINC CARBONATE, BASIC, TECHNICAL

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

1. SCOPE

1.1 Scope. This specification covers one technical grade of basic zinc carbonate $[ZnCO_3 \cdot xZn(OH)_2]$.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. Unless otherwise specified, the following specifications, standards, and handbooks of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

L-P-378 - Plastic Sheet and Strip, Thin Gauge, Polyolefin
 NN-P-71 - Pallets, Material Handling, Wood, Stringer Construction,
 2-Way and 4-Way (Partial)
 RR-S-366 - Sieve, Test
 PPP-D-729 - Drums, Shipping and Storage, Steel, 55-Gallon (208 Liters)

MILITARY

MIL-B-117 - Bags, Sleeves and Tubing - Interior Packaging

: Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, US Army Armament Research and Development Command, ATTN: DRDAR-TSC-S, Aberdeen Proving Ground, MD 21010 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 6810

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STANDARDS

MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
- MIL-STD-129 - Marking for Shipment and Storage
- MIL-STD-147 - Palletized Unit Loads
- MIL-STD-1168 - Ammunition Lot Numbering
- MIL-STD-1188 - Commercial Packaging of Supplies and Equipment

(Copies of specifications, standards, handbooks, drawings, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting 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. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable.

UNIFORM FREIGHT CLASSIFICATION RULES

(Application for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

NATIONAL MOTOR FREIGHT CLASSIFICATION RULES

(Application for copies should be addressed to the American Trucking Associations, Inc., Traffic Department, 1616 P Street, NW, Washington, DC 20036.)

ASTM STANDARDS

- D1193 - Reagent Water
- E536 - Chemical Analysis of Zinc and Zinc Alloys

(Application for copies should be addressed to ASTM, 1916 Race Street, Philadelphia, PA 19103.)

(Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

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3. REQUIREMENTS

3.1 Appearance. Zinc carbonate, basic shall be free from hard lumps, cakes, or agglomerates when tested as specified in 4.2.4.1.

3.2 Chemical characteristics. Zinc carbonate, basic shall conform to the chemical characteristics of table I when tested as specified therein.

TABLE I. Chemical characteristics

Characteristic	Percent by weight		Test paragraph
	Minimum	Maximum	
Loss on ignition	20.0	28.0	4.2.4.2
Assay (as Zn)	54.0	64.0	4.2.4.3
Soluble alkali (as Na ₂ CO ₃)	----	0.25	4.2.4.4
Cadmium (Cd)	----	0.10	4.2.4.5
Water (uncombined)	----	3.0	4.2.4.6

3.3 Granulation. No less than 99 percent by weight of the zinc carbonate, basic shall pass through a No. 325 sieve when tested as specified in 4.2.4.7.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor 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 Quality conformance inspection.

4.2.1 Lotting. A lot shall consist of the zinc carbonate, basic produced by one manufacturer, at one plant, from the same materials, and under essentially the same manufacturing conditions provided the operation is continuous. In the event the process is a batch operation, each batch shall constitute a lot (see 6.3). Each lot shall be identified and controlled in accordance with MIL-STD-1168.

4.2.2 Sampling.

4.2.2.1 For examination of packaging. Sampling shall be conducted in accordance with MIL-STD-105.

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4.2.2.2 For test. Sampling shall be conducted in accordance with table II. A representative specimen of approximately 50 grams (g) shall be removed from each sample container and placed in a suitable clean, dry container labeled to identify the lot and container from which it was taken.

TABLE II. Sampling for test

: Number of containers in batch or lot :	Number of sample containers :
: 3 to 150	: 3
: 151 to 1,200	: 5
: 1,201 to 7,000	: 8
: 7,001 to 20,000	: 10
: Over 20,000	: 20
:	:

4.2.3 Inspection procedure.

4.2.3.1 For examination of packaging. The sample unit shall be one filled unit container, ready for shipment. Sample unit containers shall be examined for the following defects using an AQL of 2.5 percent defective:

- (a) Contents per container not as specified
- (b) Container not as specified
- (c) Container closure not as specified
- (d) Container damaged or leaking
- (e) Unitization not as specified
- (f) Marking incorrect, missing, or illegible

4.2.3.2 For test. Each sample specimen taken in 4.2.2.2 shall be tested as specified in 4.2.4. Failure of any test by any specimen shall be cause for rejection of the lot represented.

4.2.4 Tests. Water in accordance with ASTM D1193 and reagent grade chemicals shall be used throughout the tests. Where applicable, blank determinations shall be run and corrections applied where significant. Tests shall be conducted as follows:

4.2.4.1 Appearance. Visually examine the specimen for hard lumps, cakes, and agglomerates.

4.2.4.2 Loss on ignition. See 6.5 for testing precautions. Weigh to the nearest 0.01 g approximately 15 g of the specimen into a tared porcelain crucible. Weigh the crucible and specimen to the nearest milligram (mg). Ignite in a muffle furnace at $600^{\circ} \pm 10^{\circ}\text{C}$. Cool in a desiccator and weigh to the nearest milligram. Repeat the heating procedure until a constant weight is obtained. Perform ignition tests in a laboratory hood. Return the residue to the desiccator and retain for use in 4.2.4.3. Calculate the percent by weight loss on ignition as follows:

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$$\text{Percent loss on ignition} = \frac{100 (A - B)}{W}$$

where: A = Weight of specimen and crucible before ignition, in grams,
 B = Weight of specimen and crucible after ignition, in grams,
 and
 W = Weight of specimen in grams.

4.2.4.3 Assay (as Zn). Weigh to the nearest 0.1 mg approximately 0.25 g of the residue after ignition from 4.2.4.2 into a tall, 400-milliliter (mL) beaker. Add 20 mL of water and dissolve in 15 mL of concentrated hydrochloric acid. Neutralize with concentrated ammonium hydroxide solution. Add 15 mL of 30-percent sulfuric acid, 10 g of ammonium chloride, and 2 drops of 1-percent diphenylamine or diphenylbenzidine in concentrated sulfuric acid as the indicator. Heat the solution to $60^{\circ} \pm 2^{\circ}\text{C}$ and titrate with 0.2N potassium ferrocyanide which has been standardized against pure zinc until the solution color becomes yellowish-green. At the beginning of the titration the solution will appear blue and then become increasingly darker until it suddenly turns yellowish-green. This is about 0.5 mL before the true end point is reached. On standing for a few seconds, the color will change back to blue. Continue the titration dropwise until the yellowish-green color remains for at least 20 seconds. (There will be a slight difference in colors if diphenylbenzidine is used as the indicator.) Calculate the percent by weight zinc as follows:

$$\text{Percent zinc} = \frac{AB (100 - C)}{W}$$

where: A = Milliliters of potassium ferrocyanide solution used,
 B = Grams of pure zinc equivalent to 1 mL of the potassium ferrocyanide solution,
 C = Percent loss on ignition calculated in 4.2.4.2, and
 W = Weight of specimen in grams.

4.2.4.4 Soluble alkali (as Na_2CO_3). Weigh to the nearest 0.01 g approximately 10 g of specimen into a 400-mL beaker. Add 200 mL of water and allow to stand on a steam bath for 1 hour, stirring every 10 minutes. Filter and wash. Titrate the filtrate and washings with 0.02N hydrochloric acid, using phenolphthalein as the indicator. Calculate the percent by weight soluble salts (as Na_2CO_3) as follows:

$$\text{Percent soluble salts} = \frac{5.3 AB}{W}$$

where: A = Milliliters of hydrochloric acid used,
 B = Normality of hydrochloric acid, and
 W = Weight of specimen in grams.

4.2.4.5 Cadmium. Determine the percent cadmium in accordance with ASTM E536.

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4.2.4.6 Water (uncombined). Weigh to the nearest 0.01 g approximately 5 g of the specimen into a weighing bottle. Stopper the bottle and weigh to the nearest milligram. Remove the stopper and heat the bottle and specimen to between 105° and 110°C. Replace the stopper, cool in a desiccator, and weigh to the nearest milligram. Repeat the heating procedure until a constant weight is obtained. Calculate the percent by weight uncombined water as follows:

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

where: A = Weight of bottle, stopper, and specimen before heating, in grams,
 B = Weight of bottle, stopper, and specimen after heating, in grams, and
 W = Weight of specimen in grams.

4.2.4.7 Granulation. Weigh to the nearest 0.01 g approximately 25 g of the specimen onto a No. 325 sieve conforming to RR-S-366. Wash the specimen through the sieve with a gentle stream of water. A camel's-hair brush may be used to facilitate the washing. Rinse the residue retained on the sieve with water, transfer to a tared porcelain crucible, allow the residue to settle, decant the excess water, and dry in an oven at 105° to 110°C. Cool to room temperature in a desiccator and weigh to the nearest milligram. Calculate the percent by weight passing as follows:

$$\text{Percent passing} = \frac{100 (W - A)}{W}$$

where: A = Weight of residue retained, in grams, and
 W = Weight of specimen in grams.

5. PACKAGING

5.1 Preservation. Zinc carbonate shall be preserved level A, B or industrial; as specified (see 6.2).

5.1.1 Level A.

5.1.1.1 Unit packing. A quantity of 50 (+0.25 or -0) pounds (1b) of zinc carbonate shall be unit packed level A in a removable head steel drum furnished with a bag liner. The bag liner shall conform to type I, class B, style 1 or 2 of MIL-B-117. The drum shall conform to requirements of Section 5, Rule 40 of the Uniform Freight Classification (UFC), but shall be cleaned and coated as specified for the drums of PPP-D-729. The bag liner shall be closed by heat sealing, tying or knotting. The drum shall be closed by bolted locking ring, using a lock-nut, lock-washer, or crimped lugs.

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5.1.2 Level B. A quantity of 50 (+0.25 or -0) lb of zinc carbonate shall be unit packed level B in a multiwall paper bag. The bag shall conform to Section 10, Rule 40 of the UFC and shall be a wet-strength plain paper Kraft shipping bag having a minimum 0.001-inch thick polyethylene film inner wall. The film shall conform to type I or II, class, grade, and finish optional of L-P-378. The bag shall be closed to prevent leakage of contents in transit and storage.

5.1.3 Industrial. A quantity of 50 (+0.25 or -0) lb of zinc carbonate shall be unit packed in accordance with MIL-STD-1188.

5.2 Packing. Zinc carbonate, unit packed level A, B, or industrially as specified in 5.1, shall require no further protection for shipment other than unitization.

5.3 Unitization. Packs of zinc carbonate protected level A or B shall be palletized in accordance with MIL-STD-147. Drums shall be palletized as required for load type III or IV, as applicable. Bags shall be palletized in accordance with requirements for load type XV, using a fiberboard cap, storage aid 4 above the top tier of bags but beneath the straps. The pallet shall conform to type IV, softwood of NN-P-71. Industrial packs of zinc carbonate shall be unitized in a manner to assure conformity with UFC and National Motor Freight Classification Rules, and acceptance by common carrier.

5.4 Marking. Level A and B containers and pallet loads shall be marked in accordance with MIL-STD-129. Industrial containers and unitized loads shall be marked in accordance with MIL-STD-1188. Each container shall be marked to show date of manufacture and lot or batch number of the zinc carbonate.

6. NOTES

6.1 Intended use. Zinc carbonate, basic is intended for use in the manufacture of smoke mixtures.

6.2 Ordering data. Acquisition documents should specify the title, number, and date of this specification, and the level of preservation required (see 5.1).

6.3 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.

6.4 Significant places. For the purpose of determining conformance with this specification, an observed or calculated value should be rounded off "to the nearest unit" in the last right-hand place of figures used in expressing the limiting value, in accordance with the rounding-off method of ASTM E29.

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6.5 Testing precautions. This specification covers testing of chemical material which is potentially hazardous to personnel. Zinc carbonate, when heated, may evolve fumes of zinc oxide, which can lead to a disease known as "brass chills." Perform ignition tests in a laboratory hood. Avoid inhalation. Avoid eye and skin contact.

Custodian:

Army - EA

Review activities:

Army - MD

DLA - GS

Preparing activity:

Army - EA

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