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# JAN-P-362

28 June 1946

JOINT ARMY-NAVY SPECIFICATION

## POWDER, BLACK, SODIUM-NITRATE

| Army Number | Navy Number |
|---|---|
| 50-14-14A | 4P8 |

This specification was approved by the War Department and the Navy Department for use of procurement services of the Army and the Navy and supersedes the following specification:

| U. S. Army | Navy Dept. |
|---|---|
| 50-14-4 | |
| 21 July 1933 | ..... |

**A. APPLICABLE SPECIFICATIONS, OTHER PUBLICATIONS, AND DRAWINGS.**

A-1. *Specifications.*—The following specifications, of the issue in effect on the date of invitation for bids, form a part of this specification:

JOINT ARMY-NAVY SPECIFICATIONS

JAN-G-155—Graphite (For Use in Ammunition)
JAN-C-178—Charcoal (For Use in Ammunition)
JAN-S-322—Sodium Nitrate

U. S. ARMY SPECIFICATIONS

50-0-1—General Specification for Ammunition Except Small Arms Ammunition.[1]
50-11-40—Sulfur (For Use in Ammunition)
100-2—Standard Specification for Marking Shipments by Contractors.[1]

NAVY DEPARTMENT SPECIFICATION

General Specifications for Inspection of Material.[2]

FEDERAL SPECIFICATION

RR-S-366—Sieves; Standard, Testing.

A-2. *Other publications.*—The following publications of the issue in effect on date of invitation for bids, form a part of this specification:

BUREAU OF SUPPLIES AND ACCOUNTS PUBLICATION

Navy Shipment Marking Handbook.[2]

INTERSTATE COMMERCE COMMISSION PUBLICATION

Regulations for Transportation of Explosives and other Dangerous Articles by Freight.

[1] Applicable only to Army purchases.
[2] Applicable only to Navy purchases.

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A-3. *Drawings.*—The following drawings of the issue in effect on the date of invitation for bids, form a part of this specification:

U. S. ARMY ORDNANCE DEPARTMENT
DRAWINGS

76-4-43—Container, Black Powder, Storage and Shipping, Assembly.
76-4-44—Container, Black Powder, Storage and Shipping, Details.
76-4-45—Bag, Cloth, Assembly and Details.

**B. GRADE AND CLASSES.**

B-1. This specification covers one grade of sodium nitrate black powder furnished in the following classes as specified in the contract or order (see par. H-1).

Class A
Class B
Class C

**C. MATERIAL AND WORKMANSHIP.**

C-1. *Material.*—Unless otherwise specified the material used in the manufacture of sodium nitrate black powder shall conform to the following requirements:

C-1a. *Charcoal.*—Charcoal shall conform to the requirements for class A of Joint Army-Navy Specification JAN-C-178.

C-1b. *Graphite.*—Graphite shall conform to the requirements for grade III of Joint Army-Navy Specification JAN-G-155.

C-1c. *Sodium nitrate.*—Sodium nitrate shall conform to the requirements of Joint Army-Navy Specification JAN-S-322.

C-1d. *Sulfur.*—Sulfur shall conform to the requirements for grade A of U. S. Army Specification 50-11-40.

**D. GENERAL REQUIREMENTS.**

D-1. *Manufacture.*—The powder shall be thoroughly incorporated in order to secure uniformity and the required strength.

D-2. *Description sheet.*—With each lot of powder submitted for acceptance the contractor shall furnish on official blanks, eight copies of a description sheet giving the composition of the powder and data concerning the manufacturing details prescribed in paragraph D-1.

D-3. *Chemical requirements.*—Sodium nitrate black powder shall conform to the chemical requirements shown in Table I

TABLE I.—*Chemical requirements*

| | *Percent* |
|---|---|
| Moisture (max.) | 0.70 |
| Sodium nitrate | 72.0 ± 2.0 |
| Sulfur | 12.0 ± 2.0 |
| Charcoal | 16.0 ± 2.0 |
| Ash (max.)[1] | 1.5 |

[1] Includes deterrent if used.

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D-4. *Foreign matter.*—The powder shall be free from all foreign material such as sticks, stones and sand.

D-5. *Specific gravity.*—The specific gravity shall be 1.74-1.82 inclusive.

D-6. *Finish.*—Unless otherwise specified in the contract or order, the powder shall have a bright black polish, glazed with graphite. The finished powder shall be practically free from dust.

**E. DETAIL REQUIREMENTS.**

E-1. *Granulation.*—Sodium nitrate black powder shall conform to the granulation requirements shown in table II using, for class A and class B, U. S. Standard sieves conforming to the requirements of Federal Specification RR-S-366. Round openings are permissible in the screens for use in testing class C powder.

TABLE II.—*Granulation*

| | *Percent* (min.) |
|---|---|
| *Class A* | |
| Through a No. 12 sieve | 100 |
| Through a No. 16 sieve | 45 |
| Retained on a No. 40 sieve | 99 |
| *Class B* | |
| Through a No. 4 sieve | |
| Retained on a No. 16 sieve | 99 |
| *Class C* | |
| Through a sieve opening of 9/16 inch | 100 |
| Retained on a sieve opening of 3/8 inch | 100 |

E-2. *Ballistic requirements (class C).*—

E-2a. *Service velocity.*—A minimum of 5 shots fired in a standard torpedo tube with a charge between limits of 32 to 40 ounces shall give a desired launching velocity for a 3,850-pound dummy torpedo of not less than 55 feet per second with a desired tube pressure of 85 to 100 pounds per square inch. No single shot shall give a velocity less than 50 feet per second nor a pressure of more than 110 pounds per square inch.

E-2b. *Variation of velocity and pressure with variation of charge.*—A series of 4 shots shall be fired. Two of the shots shall have charges 5 percent greater in weight and the other 2 shots shall have charges 5 percent less in weight than that found to give the desired velocity and tube pressure. None of these shots shall give velocities less than 55 feet per second nor pressures greater than 110 pounds per square inch.

E-2c. *Burned powder residue.*—No burning or unburned powder shall be ejected from the tube. The residue shall not be excessive nor of a highly corrosive nature.

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F. METHODS OF SAMPLING, INSPECTION, AND TESTS.

F-1. *Size of lot.*—The size of the lots shall be a maximum of 10,000 pounds.

F-2. *Sampling.*—

F-2a. *Laboratory samples.*—Unless otherwise specified, 10 percent but not more than 10 containers in the lot shall be selected by the Government inspector in such a manner as to be representative of the lot. Sufficient of the material to form a primary sample of approximately 1 pound shall be removed by means of a scoop from each selected container. This sample shall be mixed thoroughly, a 12-ounce portion placed in a rubber-stoppered bottle, and each primary sample labeled so that the container from which it was taken can be easily identified. The remaining portions of the primary samples shall be mixed thoroughly and quartered until a composite sample of approximately 1 pound is obtained. The composite sample shall be placed in a rubber-stoppered bottle or airtight can, and labeled to show the name of the material, lot number, manufacturer, plant, contract number, date of sampling, and number of pounds in the lot. All acceptance laboratory tests shall be made on the composite sample representative of the lot. Hold the primary samples for possible future examination should the composite sample fail to meet the requirements of this specification.

F-2b. *Ballistic sample (class C).*—If the powder sample selected in accordance with paragraph F-2a satisfactorily passes the laboratory tests, the Government inspector shall select a 25-pound ballistic sample representative of the lot. The ballistic sample shall be packed and marked in accordance with section G, and shall be forwarded to the Naval Gun Factory, Washington 25, D. C., for ballistic tests.

F-3. *Inspection.*—

F-3a. *Army.*—Inspection shall be made in accordance with the requirements of U. S. Army Specification 50-0-1.

F-3b. *Navy.*—Unless otherwise specified in the contract or order, inspection shall be made at the place of manufacture.

F-3c. The bureau or agency concerned may in special cases, waive the inspection of raw materials used in the manufacture of sodium nitrate black powder. However, analysis of the finished product shall not disclose impurities in greater amounts than are allowable by the proportion of raw materials incorporated.

F-4. *Laboratory tests.*—The laboratory tests shall be made in accordance with the following paragraphs. For Navy purchases, the tests shall be made at the U. S. Naval Powder Factory, Indian Head, Md., unless otherwise specified in the contract or order.

F-4a. *Preparation of sample for analysis.*—Two to 4 ounces of the sample shall be ground in small portions in a suitable mortar to pass a No. 60 U. S. Standard sieve. All precautions shall be taken to avoid unnecessary exposure of the sample to the air; hence, as soon as a portion is ground, it shall be put in a bottle and tightly stoppered. If the grinding and sifting does not require more than 3 minutes per portion, there will be no appreciable

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change in the moisture content due to hygroscopicity. The powdered sample shall be well mixed before analysis.

F-4b. *Moisture.*—Transfer a known weight of approximately 2 gm of the sample to a tared weighing dish or covered watch glass. Dry for 4 hours at 70°C. Cover the dish, cool in a desiccator and weigh. (As an alternative method, dry for 72 hours at room temperature in a desiccator over concentrated sulfuric acid.) Calculate the loss in weight as percentage of moisture in the sample as received.

F-4c. *Sodium nitrate.*—Transfer a known weight of approximately 10 gm of the sample to a 400-ml beaker. Add 200 ml of distilled water, cover, bring to a boil and hold for 15 minutes on a steam bath. Filter through a tared filtering crucible. Wash with successive portions of 10 to 15 ml of hot water. Test the wash water passing through the crucible with an excess of concentrated sulfuric acid containing a few crystals of diphenylamine until there is no blue color. Blue color indicates the presence of nitrate. Dry the crucible for 4 hours at 70° C., or until all moisture is removed, cool in a desiccator and weigh. The loss in weight represents moisture and sodium nitrate. Calculate the percentage of sodium nitrate in the moisture-free sample.

NOTE.—It is recognized that any water-soluble portions of the charcoal or sulfur are included in the above method. If special circumstances occasion the necessity for a more rigid determination of sodium nitrate content, 1 ml of nitric acid (1.42 sp. gr.) shall be added to the water extract (see par. F-4c) which is evaporated to dryness and dried for 2 hours at 150° C., cooled in a desiccator and weighed. If it is desired to test the purity of the sodium nitrate, a separate 1-gm sample of the powder shall be extracted. The filtrate shall be evaporated to dryness and a nitrometer test for nitrogen run in accordance with the method outlined in Joint Army-Navy Specification JAN-S-322.

F-4d. *Sulfur.*—After the determination of sodium nitrate as described in paragraph F-4c place the crucible in an extractor on a water bath and extract for 4 hours with carbon disulfide. After the extraction wash the crucible once with alcohol and once with ether, using suction, dry for 1 hour at 100° C., cool in a desiccator and weigh. Calculate the loss in weight of the crucible as percentage of sulfur in the sample on a moisture-free basis.

F-4e. *Charcoal.*—Consider the residue in the crucible to be charcoal. Determine its weight by subtracting the original weight of the filtering crucible from the weight of the crucible and residue, and calculate this weight as percentage of charcoal in the moisture free sample.

F-4f. *Ash.*—Ignite the crucible with its residue (see par. F-4e) in a muffle furnace or over a Bunsen burner until all of the carbon is burned off. Cool in a desiccator and weigh. Calculate the weight of residue as percentage of ash in the sample as received. If it is desired to perform this analysis simultaneously, with the analyses described in paragraphs F-4b–F-4e, a separate 5-gm sample shall be transferred to a 400-ml beaker. Extract the

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sodium nitrate as described in paragraph F-4c. Ignite the residue and determine the ash as described.

F-4g. *Foreign matter.*—Examine the residue in the filtering crucible, after the removal of the sodium nitrate and sulfur. Note if the sample is free from foreign material as indicated by the absence of sticks, stones, and sand.

F-4h. *Specific gravity.*—Transfer a known weight of sample, approximately 10 gm, to a 25-ml specific gravity bottle. Add clean mercury until the bottle is approximately ½ or ⅔ full. Displace the remaining air in the bottle with mercury as follows: Attach a piece of heavy rubber tubing approximately 2 feet long to the bottle. Connect the other end of the tubing to one arm of a Y-tube. By means of another piece of rubber tubing and a short piece of glass tubing, extend the other arm of the Y-tube to dip into a vessel containing mercury. Connect the stem of the Y-tube with a vacuum line. Close the rubber tubing leading to the mercury vessel by means of a pinchcock. Open the vacuum line in order to evacuate the specific gravity bottle. After evacuation, close the vacuum line by means of a pinchcock placed close to the Y-tube. Open the pinchcock on the tubing leading to the stem of the mercury vessel and allow the mercury to flow into the bottle. Repeat this operation until the bottle is filled with mercury. Weigh the bottle containing the powder and mercury at 20.0° ± 0.3° C. Weigh the same bottle filled with mercury at 20°/20° C. Calculate the specific gravity of the black powder at 20°/20° C. as follows:

$$\text{Specific gravity of black powder} = \frac{13.55A}{A + B - C}$$

where

A = weight of sample
B = weight of bottle filled with mercury
C = weight of bottle filled with mercury and sample.

F-4i. *Granulation.*—Place an accurately weighed portion of approximately 100 gm of sample on the specified sieves properly superimposed and assembled with a bottom pan. Cover and shake for 3 minutes by hand or by means of a mechanical shaker geared to produce 300 ± 15 gyrations and 150 ± 10 taps of the striker per minute. Weigh the portions retained or passed by the various sieves as required, and calculate the results to a percentage basis.

F-5. *Ballistic tests. (class C).*—

F-5a. *Service velocity.*—Fire the number of rounds specified in paragraph E-2a in the prescribed torpedo tube using the dummy torpedo and charges calculated to give the desired launching velocity. Measure the velocities and pressures developed. If any shot falls outside the velocity or pressure limits prescribed in paragraph E-2a, the lot shall be rejected.

F-5b. *Variation of velocity and pressure with variation of charge.*—Fire the series of shots specified in paragraph E-2b. If any shot falls outside the velocity or pressure limits prescribed in paragraph E-2b, the lot shall be rejected.

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F-6. *Resubmission.*—If the composite laboratory sample representative of the lot fails to pass the inspection tests, the manufacturer shall have the option of having analysis of each primary sample made at no further expense to the Government. The manufacturer may then remove or replace defective portions of the lot represented by the primary samples which fail to meet the requirements and resubmit the lot for acceptance, provided that the marking on the container is such that complete removal or replacement of defective portions of the lot can be made to the satisfaction of the Government inspector. No ballistics retests will be permitted.

## G. PACKAGING, PACKING, AND MARKING FOR SHIPMENT.

G-1. *Packing.*—

G-1a. *For domestic shipment.*—Unless otherwise specified in the contract or order, black powder shall be packed in commercial metal kegs of 25-pound capacity, conforming to the requirements of Interstate Commerce Commission Specification 13. Kegs shall have a slide type closure and shall be so constructed as to insure acceptance by common or other carrier for safe transportation, at the lowest rate, to the point of delivery. Kegs shall be painted black or green. Army purchases shall be packed in the containers described herein or in containers described on U. S. Army Ordnance Drawings 76-4-43 and 76-4-44.

G-1a(1). *Lining.*—All containers shall be lined with cloth bags approved by the Government inspector. Linings for Army purchases shall conform to the requirements shown on U. S. Army Ordnance Drawing 76-4-45.

G-1a(2). *Gaskets.*—All containers shall be provided with a gasket that completely covers the opening.

G-1b. *For overseas shipment.*—Black powder intended for overseas shipment shall be packed in metal containers as described in paragraph G-1a, and in addition the containers shall be crated, two containers per crate. The design and construction of the crates shall be approved by the Government and be in compliance with regulations covering overseas shipment.

G-2. *Marking.*—In addition to any special marking required by the contract or order, shipments for the Army shall be marked in accordance with the requirements of U. S. Army specification 100-2; for the Navy in accordance with the requirements of the Navy Shipment Marking Handbook.

## H. NOTES.

H-1. Requests, requisitions; schedules, and contracts or orders should contain the following features:

(a) Title of the specification, the number, and the date,

(b) Class desired. (see par. B-1).

(c) Whether the powder is to be packed for domestic or overseas shipment (see Sec. G).

H-2. *Use.*—Class A sodium nitrate black powder is intended for use in saluting charges. Class B sodium nitrate black powder is intended for use in practice bombs. Class C sodium nitrate black powder is intended for use in torpedo impulse charges.

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H-3. *Bid sample (class C).* Bidder is required to submit a 25-pound sample of the powder, similar to that which he proposes to furnish under the schedule, to the Naval Gun Factory, Washington 25, D. C. for determination of the proper weight of charge and compliance with this specification. Bid samples should reach the Naval Gun Factory not later than one week prior to opening of bids. Samples should be packed and marked in accordance with section G of this specification and should in addition be marked with the date of opening of bids. The right is reserved to make award on the basis of cost per charge which is to be computed by multiplying the cost per pound of powder by the weight of charge of powder in pounds which is required to give the prescribed torpedo ejection velocity.

H-4. This Joint Army-Navy specification replaces Picatinny Arsenal Tentative Specification PXS-859.

H-5. Copies of U. S. Army Ordnance Department drawings may be obtained upon application to Office of the Chief of Ordnance, War Department, Washington 25, D. C.

H-6. Copies of Interstate Commerce Commission Regulations for Transportation of Explosives and Other Dangerous Articles by Freight, of which Interstate Commerce Commission Specification 13 forms a part, may be obtained upon application, accompanied by postal note, money order, coupon, or cash, to the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Price, 40 cents.

H-7. Copies of Joint Army-Navy and Federal specifications (required for Army purchases) and U. S. Army specifications may be obtained as indicated in the "Index of United States Army, Joint Army-Navy and Federal Specifications Used by the War Department." Copies of this Index may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Agencies within the War Department will obtain copies of Joint Army-Navy, U. S. Army and Federal specifications through established War Department channels. Both the title and identifying symbol number should be stipulated when requesting copies of specifications.

H-8. Copies of Joint Army-Navy and Federal specifications (required for Navy purchases), Navy Department specifications, and the Navy Shipment Marking Handbook may be obtained upon application to the Bureau of Supplies and Accounts. Navy Department, Washington 25, D. C., except that Naval activities should make application to the Supply Officer in Command, Naval Supply Depot, Bayonne, N. J. Both the title and identifying symbol number should be stipulated when requesting copies of specifications.

H-9. Copies of this Joint Army-Navy specification (required for Army purchases) may be obtained from the Office, Chief of Ordnance, War Department, Washington 25, D. C.

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**ARMY: O**
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[JAN-P-362]