

MIL-B-48387(PA)

1 April 1975

## MILITARY SPECIFICATION

BALL POWDER, IGNITER (BP1)  
(FOR USE IN CHARGES, PROPELLING FOR ARTILLERY SYSTEMS)

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

## 1. SCOPE

1.1 This specification covers one type of igniter ball powder for use in ammunition (see 6.1).

## 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.

## SPECIFICATION

## MILITARY

MIL-D-98	- Diphenylamine
MIL-G-155	- Graphite
MIL-D-204	- Dinitrotoluene (For Use in Explosive)
MIL-D-218	- Dibutylphthalate
MIL-N-244	- Nitrocellulose (For Use in Explosive)
MIL-C-293	- Calcium Carbonate
MIL-A-48078	- Ammunition Standard Quality Assurance Provisions, General Specification for
MIL-S-50004	- Sodium Sulfate

## STANDARDS

## MILITARY

MIL-STD-286	- Propellant, Solid, Sampling, Examination and Testing
MIL-STD-652	- Propellants, Solid, for Cannons Requirements and Packing

FSC: 1376

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(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement function 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 to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

#### CODE OF FEDERAL REGULATIONS

##### Title 49 - Transportation, CFR Parts 100-199

(The Interstate Commerce Commission Regulations are now a part of the Code of Federal Regulations, available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Orders for the above publications should cite, "49 CFR Parts 100-199 (latest revision)".

### 3. REQUIREMENTS

3.1 Constituent material. - The constituent materials shall comply with requirements of the applicable specification as follows:

<u>Constituent Material</u>	<u>Conforming to Specification</u>
Diphenylamine	MIL-D-98
Graphite	MIL-G-155 Grade III or IV
Dinitrotoluene	MIL-D-204
Dibutylphthalate	MIL-D-218
Nitrocellulose	MIL-N-244
Calcium Carbonate	MIL-C-293
Sodium Sulfate	MIL-S-50004

### 3.2 Chemical and physical properties.

3.2.1 Chemical composition. - The chemical composition shall comply with the requirement given in Table I on volatiles free basis when tested as specified in 4.5.1.

Table I

<u>Material</u>	<u>Percent</u>
Nitrocellulose, Min.	94.5
Nitrogen in Nitrocellulose	13.00 to 13.20
Dinitrotoluene, Max.	2.0
Graphite, Max. added.	0.4
Diphenylamine	0.75 to 1.50
Calcium Carbonate, Max.	1.0

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Table I (CON'T)

Moisture	0.6 $\pm$ 0.2
Sodium Sulfate, Max.	0.5
Total Volatiles, Max.	2.0

3.2.2 Physical properties. - The propellant shall comply with the requirement given in Table II when tested as specified in 4.5.1.

Table II

<u>Test</u>	<u>Value</u>
Heat test 134.5°C	
Discoloration to Salmon Pink, Minutes, Min.	45
Explosion, hours, Min.	5
Dust and Foreign Matter, %, Max.	0.25
Bulk Density gm/cc	0.360 $\pm$ 0.050

3.3 Process. - When reworked propellant is one of the basic materials used in the process, the following impurities in the requirements in Table I shall be allowed when tested as specified in 4.5.1.

<u>Material</u>	<u>Percent</u>
Potassium Nitrate, Max.	0.4
Potassium Sulfate, Max.	0.4
Nitroglycerin, Max.	1.0
Dibutylphthalate, Max.	2.0

3.4 Ballistics. - Ball powder igniter (BPI) when fired from a M114A1, 155MM, Howitzer under standard conditions with an M4A2 Propelling Charge at Zone VII and a 95.0 lb. M107 Projectile shall comply with the following requirements.

3.4.1 Uniformity of muzzle velocity. - The standard deviation of velocity shall not exceed 7.2 fps at +70°F or -65°F when tested in accordance with 4.5.2. (see 6.3).

3.4.2 Functioning. - The BPI shall function satisfactorily without misfires or hangfires when tested in accordance with 4.5.2.

3.5 Closed bomb. - The propellant tested in the closed bomb shall have a relative quickness of 100  $\pm$  5 percent when tested as specified in 4.5.3.

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3.6 Granulation. - The propellant shall comply with the requirements of Table III when tested as specified in 4.5.4.

Table III

<u>U.S. Standard Sieve, Size</u>	<u>Percent</u>
25	95 Min. through
30	90 Min. retained
60	5 Max. through
70	3 Max. through

3.7 Initial production. - This specification contains technical provisions for Initial Production Testing. Requirements for submission of samples for this testing is included in 4.4.3.2. Ball Powder lots will be subjected to Initial Production Testing until ten (10) successive lots have complied with the requirements of 3.4. In addition, the procedure will be repeated whenever a change in a lot interfix occurs (see 4.5.2.1).

3.8 Workmanship. - The best commercial practices shall be used in the formulation of propellant furnished under this specification, and all other applicable documents. The propellant and its standard ingredients shall be protected from the action of direct sunlight and acid fumes.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection and standard quality assurance provisions. - Unless otherwise specified herein or in the contract, the provisions of MIL-A-48078 shall apply and are hereby made a part of this detail specification.

4.2 Classification of inspections. - The following types of inspection shall be conducted on this item:

- a. Initial production (see 3.4, 4.4.3.3.1, 4.4.3.4.1 and 4.5.2.1).
- b. Quality conformance inspection (see 4.3).
- c. Packaging inspection (see 5).

#### 4.3 Quality conformance inspection

4.3.1 Inspection lot formation. - Inspection lots shall comply with the lot formation provisions of MIL-A-48078. For the material, covered by this specification, a lot shall consist of one or more batches of propellant produced by one manufacturer, in accordance with the same specification, or same

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specification revision, under one continuous set of operating conditions. Each batch shall consist of that quantity of propellant that has been subjected to the same chemical or physical process.

#### 4.4.3 Testing.

4.4.3.1 Sampling for chemical and physical tests. - The sampling shall be in accordance with MIL-STD-652, except that a five pound sample shall be used for chemical and physical tests. If the sample fails to meet any of the requirements of paragraph 3, the lot shall be rejected.

4.4.3.2 Testing of ball powder. - The sample obtained in 4.4.3.1 shall be subjected to the following tests:

<u>Test</u>	<u>Defects Classification</u>
Nitrocellulose	Major B
Diphenylamine	Major B
Total Volatiles	Major B
Bulk Density	Major B
Closed Bomb	Major B
Granulation	Major B
Calcium Carbonate	Major B
Sodium Sulfate	Major B
Nitroglycerin	Major B
Potassium Sulfate	Major B
Potassium Nitrate	Major B
Dust and foreign material	Major B
Heat Test	Major B
Dinitrotoluene	Major B
Graphite	Major B
Dibutylphthalate	Major B
Workmanship	Major B
Moisture	Major B

4.4.3.3 Selection and submission of production samples to proving grounds:

4.4.3.3.1 Initial production lots. - Beginning with the first lot and continuing until ten (10) successive lots have complied with the requirements of 3.4, twenty (20) pounds of BPI powder shall be forwarded to a Government Proving Ground as designated by the contracting officer. In addition, the procedure shall be repeated whenever a change in a lot interfix occurs. Selection, of the sample shall be as follows:

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- a. Select ten (10) containers at random from the lot. (If lot consists of less than 10 containers select all containers.)
- b. Extract an equal (approximate) amount of powder from each container with a scoop to achieve the total sample weight.
- c. Place powder removed from each container in an individual package and ship to proving ground.

4.4.3.3.2 Subsequent production. - After ten (10) consecutive lots of a new interfix have complied with 3.4, the BPI sample size shall be reduced to 2 pounds (lbs). Selection and submission shall be as stated (except for sample size) in 4.4.3.3.1.

4.4.3.4 Ballistic testing of ball powder.

4.4.3.4.1 Initial production lots. - Beginning with the first lot and continuing until ten (10) successive lots have complied with the requirements of 3.4. Ballistic sampling and acceptance shall be in accordance with 4.4.3.3.1 and Table IV. In addition, the procedure shall be repeated whenever a change in a lot interfix occurs.

Table IV

<u>Temperature</u>	<u>Sample Size</u>	<u>Characteristic</u>	<u>Acceptance Criteria</u>
70 degrees F	25	Velocity Std. Deviation	Reject if std. dev. of observed velocities exceeds 8.9 fps (major defect)
		Misfires	Reject if one or more misfires attributable to BPI powder are experienced (major defect)
		Hangfires	Refer if one or more audible hangfires are experienced or one or more ignition delay times greater than 500 milliseconds is recorded
-65 degrees F	25	Same as 70 degrees firing	Same as 70 degrees F firings

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4.4.3.4.2 Subsequent lots. - After ten (10) successive lots of a new interfix have satisfied the requirements of 3.4. Ballistic Sampling and acceptance shall be in accordance with 4.4.3.3.2 and Table V.

Table V

<u>Temperature</u>	<u>Sample Size</u>	<u>Characteristics</u>	<u>Acceptance Criteria</u>
70 degrees F	5	Misfires	Reject if one or more misfires attributable to BPI powder are experienced (major defect) (see 3.4.2)
		Hangfires	Refer if one or more audible hangfires are experienced during testing or if one or more ignition delay times greater than 500 ms is recorded (see 3.4.2)

4.5 Test methods and procedures-(see 6.7). - The tests in 4.5.1 shall be performed using prescribed analytical procedures for duplicate determinations given in standard analytical textbooks.

4.5.1 Chemical and physical properties. - The chemical and physical properties shall be determined as specified in Table VI in accordance with Methods from MIL-STD-286.

Table VI

<u>Properties</u>	<u>Methods</u>
Moisture	102.1
Nitrocellulose	209.2
Dinitrotoluene	T226.1, 205.1, 205.2 or 205.3
Graphite	306.2
Diphenylamine	T226.1, 201.4 or 217.3
Dibutylphthalate	T226.1, 204.1 or 222.1
Total Volatiles	T103.5, 103.3
Moisture	102.1 or 101.5
Heat Test	404.1
Dust and Foreign Matter	501.1
Bulk Density	502.1

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Table VI (Con't)

<u>Properties</u>	<u>Methods</u>
Nitroglycerin	208.1
Calcium Carbonate	305.1, T316.1 or T317.1
Sodium Sulfate	305.1, T316.1 or T317.1
Potassium Nitrate	305.1, T316.1 or T317.1
Potassium Sulfate	305.1, T316.1 or T317.1

4.5.2 Ballistics. - All testing shall be conducted at a Government Proving Ground in accordance with applicable Acceptance Test Procedures.

4.5.2.1 Initial production lots. - Fifty igniter bag charges shall be assembled with sample powder submitted by the manufacturer taking care that one bag charge contains powder from not more than one package (see 4.4.3.3.1). Twenty-five of these igniter bag charges shall be assembled into M4A2 Propelling charges, conditioned to -65 degrees F (with a mylar protective bag) and fired with an M107 Projectile within 3 minutes after removal from conditioning box. The remaining twenty-five shall be conditioned to 70 degrees F and similarly fired. The propelling charge shall be positioned a minimum of five inches from the rear face of the tube prior to firing. A MK2A4 or M82 Primer manufactured within five years of date of testing shall be used. These Primers shall not be conditioned. All propelling charges shall be fired at Zone VII and the igniter protective cap shall not be removed until just prior to insertion of the propelling charge into the weapon. A minimum of 10 calibration rounds loaded with standard BPI powder shall be fired in conjunction with the test items. Velocity, and ignition delay times shall be electronically recorded and observation for misfires and hangfires shall be made.

4.5.2.2 Subsequent lots. - Testing shall be conducted as specified in 4.5.2.1 with the exception that only five igniter bag charges are required for test (70 degrees F only) and control samples. Also muzzle velocity measurements are not needed.

4.5.3 Closed bomb test. - The closed bomb test shall be determined in accordance with method 801.1 of MIL-STD-286.

4.5.4 Granulation. - The granulation shall be determined in accordance with Method 506.1 of MIL-STD-286.

## 5. PREPARATION FOR DELIVERY

5.1 Packing. - The packing shall be in accordance with MIL-STD-652.



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## 6. NOTES

6.1 Intended use. - It is intended that the material of this specification will be used as an igniter in propelling charges for the 155MM Howitzer.

6.2 Ordering data

- a. See MIL-A-48078.
- b. Packing required (see 5.1).
- c. Process. - Details of the manufacturing process and the equipment used by the contractor will be submitted to the procuring activity in writing prior to commencement of manufacture.
- d. Initial production.

6.3 Standard deviation. - The standard deviation should be calculated with (N-1) as the division in a standard statistical technique equivalent to that shown in MIL-STD-414, Section B, Example B-1.

6.4 Chemical stability testing. - Five pounds of igniter composition shall be selected at random from the lot, and shall be forwarded to the Commander, Picatinny Arsenal, Dover, New Jersey for the 65.5 degree Centigrade surveillance test in accordance with MIL-STD-286, Method T407.1.

6.5 Submission of SMU Form 1047. - Information contained in propellant description sheet, SMU Form 1047, need not be resubmitted in the form of a certificate provided the provisions regarding certifying of responsible agents is adhered to (see 4.1). Copies of sheets should be forwarded to Commander, Picatinny Arsenal, ATTN: SARPA-QA-A-P, and SARPA-AD-EP, Dover, N.J. 07801.

6.6 Process control. - The data obtained from the composition chemical analysis for each batch of igniter composition for the first five lots shall be forwarded to the Commander, Picatinny Arsenal, ATTN: SARPA-QA-A-P, Dover, New Jersey 07801.

6.7 Prior approval of the Contracting Officer is required for use of equivalent test methods. A description of the proposed method should be submitted through the Contracting Officer to: Commander, Picatinny Arsenal, ATTN: SARPA-QA-A-P, Dover, New Jersey 07801. This description should include but not be limited to the accuracy and precision of the method, test data to demonstrate the accuracy and precision and drawings of any special equipment required.

Custodian:  
Army - PA

Preparing Activity:  
Army - PA

Project Number: 1376-A038

**STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL**OMB Approval  
No. 22-R255

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