

MIL-P-48058 (MU)
18 April 1972
SUPERSEDING
JAN-P-309
28 March 1946

MILITARY SPECIFICATION

PROPELLANT M6
FOR USE IN CARTRIDGE 105MM, HEP-T, M327

1. SCOPE

1.1 This specification covers M6 Propellant for use in the following Cartridge employed with the M2A1, M2A2, M4, M4A1, M49, M103, M137 and M165, 105MM Howitzers.

Cartridge, HEP-T, M327

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.

STANDARDS

MILITARY

- MIL-STD-109 - Quality Assurance Terms and Definitions
- MIL-STD-652 - Propellants Solid for Cannons Requirements and Packing
- MIL-STD-1168 - Lot Numbering of Ammunition
- MIL-STD-1172 - Acceptance and Description Sheets for Propellants and Explosives

SPECIFICATIONS

MILITARY

- MIL-A-2550 - Ammunition and Special Weapons; General Specification For

DRAWINGS

ARMY

- 9269202 - Charge, Propellant for Cartridge 105MM, HEP-T, M327
- 75-1-362- Cartridge, HEP-T, M327

FSC: 1375

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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 shall apply.

CODE OF FEDERAL REGULATIONS

Title 49, Transportation: Parts 171-179

The Code of Federal Regulations is available from the Superintendent of Documents, Government Printing Office, Washington, D.C., 20402. Orders for the above publication should cite: 49 CFR 171-179 (latest revision).

3. REQUIREMENTS

3.1 Materials.-The propellant shall be M6, Type I nominal web .030 inch conforming to the requirements of Standard MIL-STD-652

3.2 Proving Ground.-The propellant, when fired in an M2A2 Howitzer with the weight of projectile (23.5 lbs) for which it was manufactured, shall comply with the following requirements when tested as specified in 4.3.(See 6.11)

3.2.1 Assessment.-At 70 degrees Fahrenheit (°F) and standard weapon conditions, the propellant shall be capable of charge assessment to a velocity of 1835 feet per second without an associated expected pressure greater than 31,200 (psi).

3.2.2 Uniformity of velocity.-The standard deviation in velocity for the lot at 70°F shall not exceed 9.1 feet per second.

3.2.3 Permissible Individual Maximum Pressure.-The propellant at recommended charge weight shall not produce a chamber pressure greater than 35,900 psi at any operating temperature (-40°F to +145°F) when fired in a standard weapon.

3.3 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. No reground propellant or nitrocellulose shall be used in the manufacture of propellant procured under this specification unless otherwise specified.

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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. Reference shall be made to Standard MIL-STD-109 in order to define terms used herein. The provisions of Specification MIL-A-2550 shall apply.

4.1.1 Submission of product.-At the time the completed lot of product is submitted to the Government for acceptance, the contractor shall supply the following information accompanied by a certificate which attests that the information provided is correct and applicable to the product being submitted:

- a. A statement that the lot complies with all of the quality assurance provisions specified within this specification
- b. Number of batches of product inspected (shall be made available upon request by the contracting officer).
- c. Results obtained, by defect code, for all inspections performed (shall be made available upon request by the contracting officer).
- d. Drawing, specification number, and date, together with an identification and date of changes.
- e. Certificates of conformance on all material purchased by the contractor when such material is controlled by Government or commercial specifications referenced in any of the contracting documents (shall be made available upon request by the contracting officer).
- f. Number of items in the lot.
- g. Date submitted.
- h. Eight copies of propellant description sheet SMU Form 1060 containing the applicable data. (see 6.8)

4.1.2 The certificate shall be signed by a responsible agent of the certifying organization. The initial certificate submitted shall be substantiated by evidence of the agent's authority will not be required with subsequent certificates unless, during the course of the contract, this authority is vested in another agent of the certifying organization.

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4.2 Inspection provisions

4.2.1 Lot formation.-The term "lot" as used throughout this specification, refers to an inspection lot, which is defined as an essentially homogeneous quantity of propellant from which the sample was drawn and shall not be construed to represent any prior or subsequent quantities presented for inspection. A lot shall consist of one or more sub-lots or one or more batches of M61 propellant produced by one manufacturer, in accordance with the same specification, and same specification revision, under one continuous set of operating conditions. Each lot shall consist of that quantity of M10 propellant which has been subjected to the same unit chemical or physical process intended to make the final product homogeneous.

4.2.2 Testing

4.2.2.1 Materials (see 3.1) Each lot of propellant shall be sampled and tested for composition, form, dimensions and chemical/physical properties in accordance with MIL-STD-652.

4.2.2.2 Proving ground (see 3.2).-Each lot of propellant shall be sampled for proving ground tests in accordance with MIL-STD-652.

4.2.2.2.1 Assessment (see 3.2.1).-Major defect, Code No. 01001 (see 6.4).-The lot shall be rejected if the assessed charge weight of propellant has an expected pressure greater than 31,200 psi.

4.2.2.2.2 Velocity Uniformity, -70°F (See 3.2.2 as of the factor 0.69 times the velocity standard deviation of the rounds tested in accordance with 4.3.3 exceeds the applicable requirement the lot shall be rejected. For initial production lots a ten round sample shall be tested and the factor shall be 0.73 (see 6.5 and 6.6)

4.2.2.2.3 Individual Pressure

4.2.2.2.3.1 Initial Production

4.2.2.2.3.1.1 145°F .-If any individual pressure observed during uniformity firings at 145°F after correction for difference between as fired and recommended service charge weight exceeds 35,900 psi, the lot shall be rejected.

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4.2.2.2.3.1.2 70°F.-If any individual pressures observed during the 70°F uniformity series when corrected to standard conditions and recommended charge weight exceeds 35,900 the lot shall be rejected.

4.2.2.2.3.1.3-40°F.-If any individual pressure observed during uniformity firings at -40°F after correction for difference between as fired and recommended service charge weight exceeds 35,900 psi, the lot shall be rejected.

4.2.2.2.3.2 Subsequent Production.-70°F.-If any individual pressures observed during the 70°F uniformity series when corrected to standard conditions and recommended charge weight exceeds 35,900-75xpressure temperature coefficient (established during Initial Production Testing) the lot shall be tested at +145 in accordance with 4.3.3.1.2.

4.3 Test methods and procedures

4.3.1 Proving Ground Tests.-These tests shall be conducted at a Government Proving Ground (designated by the contracting officer) in accordance with the applicable Proving Ground Acceptance Test Procedure.

4.3.2 Charge assessment

4.3.2.1 Charge Slope Method.-Three or more groups of rounds loaded with selected charge weights of propellant (weights selected should bracket expected service charge weight) shall be conditioned and fired at 70°F. From the data obtained, a charge weight shall be calculated which will yield the prescribed service velocity. This calculated charge weight shall then be loaded into rounds for the uniformity series (see 4.3.3). The difference between the corrected velocity obtained during the uniformity series and the service velocity shall be compensated for by a final adjustment in charge weight using the slope of the vel-chg weight curve previously established.

4.3.2.2 Constant Slope Method.-After ten (10) lots of a given production series have been fired to provide a good knowledge of the propellant characteristics, this charge slope method of assessment may be discontinued and the charge weight determined by the constant-slope method. A composite velocity vs charge weight vs pressure curve can be established from test results generated. And this curve can then be used as in 4.3.2.1 Above to calculate the charge weight needed to achieve service velocity. This calculated charge weight is then to be loaded into rounds for the uniformity series and final adjustment is to be made as indicated above for the charge slope method.

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4.3.3 Uniformity series

4.3.3.1 Initial Production

4.3.3.1.1 145°F.-Ten rounds of M327 Cartridges shall be assembled with the assessed charge of propellant, conditioned to 145°F (as indicated by a thermocoupled control rd) and fired alternately with calibration rounds at the same temperature. The velocity and pressure means as well as the standard deviations associated with these parameters shall be calculated. All results shall be corrected to recommended charge weight conditions (i.e. difference between as fired charge weight and recommended charge weight). (See 6.10)

4.3.3.1.2 70°F.-Ten rounds of M327 Cartridges shall be assembled with the assessed charge of propellant, conditioned to 70°F (as indicated by thermocoupled control rd) and fired alternately with calibration rounds at the same temperature. The velocity and pressure means as well as the standard deviations associated with these parameters shall be calculated. All results shall be corrected to standard shell weight (23.5 lbs.) and standard weapon/firing conditions (i.e. the difference between calibration performance under test conditions and standard conditions) and to recommended charge weight conditions.

4.3.3.1.3 -40°F.-Ten rounds of M327 Cartridges shall be assembled with the assessed charge of propellant, conditioned to -40°F (as indicated by a thermocoupled control rd) and fired alternately with calibration rounds at the same temperature. The velocity and pressure means as well as the standard deviations associated with these parameters shall be calculated. All results shall be corrected to recommended charge weight conditions (i.e. difference between as fired charge weight and recommended charge weight).

4.3.3.2 Subsequent Production.-Seven rounds of M327 Cartridges shall be assembled and tested at 70°F while 145°F and -40°F testing shall be omitted entirely. The velocity and pressure means as well as the standard deviations associated with these parameters shall be calculated. All results and standard weapon/firing conditions and recommended charge weight conditions (See 4.2.2.2.3.2)

4.3.4 Refiring.-If for any reason the proving ground considers that test conditions have detrimentally affected the test result, additional charges as required shall be tested.

5. PREPARATION FOR DELIVERY

5.1 Packing and marking.-Packing and marking shall be in accordance with Standard MIL-STD-652.

6. NOTES

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6.1 Ordering data.-Procurement documents should specify the following:

- a. Title, number and date of this specification.
- 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.

6.2 Standard deviation.-The standard deviation shall be calculated with $(n-1)$ as the divisor in a standard statistical technique equivalent to that shown in Standard MIL-STD-414, Section B, Example B-1.

6.3 Submission of test data.-In addition to the normal distribution of records, when the propellant is procured by the Department of the Army, one copy of all ballistic test data shall be forwarded to: Commanding Officer, Picatinny Arsenal, ATTN: SMUPA-QA-A-P, and one copy to ATTN: SMUPA-ADEP-2, Dover, New Jersey 07801.

6.4 Inspection code numbers.-The five digit code numbers assigned to the inspections herein are to facilitate future data collection and analysis by the Government.

6.5 Factors 0.69 and 0.73.-The factors 0.69 and 0.73 make allowances for the probability that a standard deviation from a seven (7) and ten (10) round sample respectively exceeds the true standard deviation by chance alone.

6.6 Initial production lots.-The initial production lots represent the first three consecutive lots from each manufacturer which have been produced and met the acceptance criteria of this specification. Lapse in production of 90 days or more shall cause testing to revert back to initial production plan.

6.7 Tolerance.-A tolerance of minus 5 degrees F. applies to all -40° and 145 degrees F. requirements and a tolerance of plus or minus 2 degrees F. to all 70 degree F. requirements.

6.8 Submission of SMU Form 1060.-Information contained in propellant description sheet, SMU Form 1060, need not be resubmitted in the form of a certificate provided the provisions regarding certifying of responsible agents is adhered to (see 4.1.2).

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6.9 Surveillance sample.-Samples shall be forwarded to Picatinny Arsenal, Dover, N.J., ATTN: SMUPA-FR-G, for the propellant surveillance test program in accordance with MIL-STD-652.

6.10 Test Cartridges shall be assembled in accordance with following drawings:

75-1-362: Ctg 105MM, M327, HEP-T

6.11 The service velocity for the M327 Ctg in the M2A1 and M4 Howitzer is 1880 fps, in the M2A2, M4A1 and M49 Howitzer it is 1835. The service velocity in the M103, M137 and M165 is 1978 fps.

6.12 Proving Ground Test Summary

Initial Production

Temp	Sample Size	Vel(fps) Reqm't	Lot S.D-vel (fps)	Press Reqm't (psi)	Lot S.D-Press (psi)
-40	10	N/A	N/A	35,900*	N/A
+70	10	1835fps	13	31,200avg	N/A
+145	10	N/A	N/A	35,900*	N/A

Subsequent Production

+70	7				
+145**	10	N/A	N/A	35,900*	N/A

*Max individual pressure

**To be fired only when 70°F results indicate that marginal performance may exist at high temperature pressure (See 4.2.2.2.3.2)

Note: Test weapon shall be the M2A2 Howitzer

Custodian:
Army-MU

Preparing Activity:
Army-MU

Project No. 1375-A-009

SPECIFICATION ANALYSIS SHEET		Form Approved Budget Bureau No. 22-R255
<p>INSTRUCTIONS: This sheet is to be filled out by personnel, either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments and suggestions submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or serve to amend contractual requirements.</p>		
SPECIFICATION		
ORGANIZATION		
CITY AND STATE		CONTRACT NUMBER
MATERIAL PROCURED UNDER A <input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> SUBCONTRACT		
1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? A. GIVE PARAGRAPH NUMBER AND WORDING.		
B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES		
2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID		
3. IS THE SPECIFICATION RESTRICTIVE? <input type="checkbox"/> YES <input type="checkbox"/> NO (If "yes", in what way?)		
4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)		
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