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INCH-POUND

MIL-C-63990C (AR)
15 February 1994
SUPERSEDING
MIL-C-63990B (AR)
18 April 1986

MILITARY SPECIFICATION

CARTRIDGE 5.56MM, TRACER, M856

This specification is approved for use by the U.S. Army Armament, Munitions and Chemical Command, and is available for use Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the requirements, examinations and tests for the M856 Tracer cartridge for, use in 5.56mm weapon systems with a "one in seven" (one revolution in seven inches) barrel twist (see 6.1).

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards and hanbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document, should be addressed to: Commander, U.S. Army ARDEC, ATTN: SMCAR-BAC-S, Picatinny Arsenal, New Jersey 07806-5000 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 1305

AMSC N/A

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SPECIFICATIONS

MILITARY

MIL-A-255C - Ammunition, General Specification for
MIL-A-48078 - Ammunition, Standard Quality Assurance Provisions, General Specification for

STANDARDS

MILITARY

MIL-STD-109 - Quality Assurance Terms and Definitions
MIL-STD-636 - Visual Inspection Standards for Small Arms Ammunition Through Caliber .50
MIL-STD-644 - Visual Inspection Standards and Inspection Procedures for Inspection of packing
MI L- STD-1168 - Lot Numbering of Ammunition

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the DODSSP - Customer Service, Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.1.2 Other Government documents, drawings, and publications . The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DRAWINGS (see 6.5)

U S ARMY ARMAMENT RESEARCH, DEVELOPMENT AND ENGINEERING CENTER (ARDEC)

7643674 - Classification of Cartridge Case Defects for Small Arms Ammunition
9342865 - Cartridge, 5.56mm, Tracer, M856
9342866 - Bullet, Tracer 5.56mm
9349660 - Filler, Point
9357841 - Cartridge, 5.56mm, Ball, (Heavy Bullet) Reference
9357839 - Jacket, Pointed

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INSPECTION EQUIPMENT

LI-9342865 - Index of Inspection Equipment Lists for Cartridge, 5.56 mm, Tracer M856

PACKAGING AND MARKING

12551963 - Packing and Marking for Box, Wirebound, for cartridge, 5.56mm

12590217 - Packing and Marking for Box, Wirebound for PA108 Ammunition Container

PUBLICATIONS

SCATP-5.56mm - Small Caliber Ammunition Test procedures (Heavy Bullet) for 5.56mm (Heavy Bullet) Cartridges

(copies of other Government documents, drawings, and publications required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Non-Government Publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issue of the documents which are DoD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issue of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2) .

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E92 - Method of Test for Vickers Hardness of Metallic Materials

(Application for copies of ASTM publications should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has be obtained. (See contract provisions for additional precedence criteria.)

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3. REQUIREMENTS

3.1 Cartridge. The cartridge shall comply with all requirements specified on drawing 9342865, all associated drawings and with all requirements specified in applicable specifications and standards.

3.2 Component parts and materials. Component parts and materials shall be in accordance with the applicable drawings and specifications.

3.3 Bullet extraction. The force required to extract the bullet from the cartridge case shall not be less than 45 pounds.

3.4 Residual stress. The cartridge case shall not split when subjected to a 1 percent mercurous nitrate solution for 15 minutes.

3.5 Waterproofness. The cartridge shall not release more than one bubble of air when subjected to a positive internal pressure of 7.5 pounds per square inch (psi) for 30 seconds minimum.

3.6 Velocity. The average velocity of the cartridges, conditioned at 70° ± 2°F, shall be 2,990 feet per second (fps) ± 40 fps at 78 feet from the muzzle of the weapon. The standard deviation of the velocities shall not exceed 40 fps.

3.7 Chamber pressure. The average chamber pressure of the sample cartridges, conditioned at 70° ± 2°F shall not exceed 55,000 psi. 55,000 psi. Neither the chamber pressure of an individual test cartridge nor the average chamber pressure plus three standard deviations of chamber pressure shall exceed 61,000 psi.

3.8 Port Pressure. The mean port pressure minus three standard deviations shall not be less than 12,700 psi for sample cartridges conditioned to 70° ± 2°F.

3.9 Trace test.

3.9.1 Night test. The bullet of the tracer cartridge shall exhibit a trace below full luminosity and preferably invisible from the muzzle of the weapon for a range of at least 43 feet (14.3 yards, 13 meters). Visible trace of full luminosity shall begin at a range not greater than 230 (76.7 yards, 70 meters) feet from the muzzle of the weapon and shall continue to a minimum range of 2,950 feet (983.3 yards, 900 meters) .

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3.9.2 Day test. The bullet of the tracer cartridge shall exhibit ignition of the trace when fired from both the M249 machine gun and M16A2 rifle.

3.10 Temperature stability. The action time, pressure and velocity of sample cartridges conditioned and fired at the temperature extreme specified below shall be in accordance with 3.10.1, 3.10.2, 3.10.3 and 3.10.4.

a. Conditioned at 125° ± 2°F for not less than one hour and fired at that temperature.

b. Conditioned at -65° ± 2°F for not less than one hour and fired at that temperature.

3.10.1 Velocity. The average velocity shall not decrease by more than 250 fps with respect to the average velocity of the sample cartridges conditioned at 70° ± 2°F. Any increase in velocity is acceptable.

3.10.2 Chamber pressure. The average chamber pressure shall not vary from the average chamber pressure of the sample test cartridges conditioned to 70° ± 2°F by more than 7,000 psi. The average chamber pressure of the sample cartridges conditioned at 125 ± 2°F shall not exceed 60,000 psi. Any deecrease in chamber pressure is acceptable.

3.10.3 Port Pressure. The average port pressure shall not vary by more than 1,500 psi from the average port pressure of the sample test cartridges of the same lot conditioned at 70° ± 2°F, and shall not be less than 11,400 psi.

3.10.4 Action time. The mean action time for these cartridges shall be as stated in 3.15.

3.11 Accuracy Both the average vertical standard deviation and the average horizontal standard deviation shall be no greater than 10.3 inches at 600 yards.

3.12 Function and casualty. The cartridge shall function without casualty at ambient temperature and under the temperature conditions specified below in both the M249 machine gun and M16A2 rifle.

a. Conditioned at 125° ± 2°F for not less than one hour and fired at that temperature.

b. Conditioned at -65° ± 2°F for not less than one hour and fired at that temperature.

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3.13 Fouling. The fouling accumulated in the M16A2 and M249 weapons during the firing of sample cartridges shall not cause failure of either weapon to function.

3.14 Bullet integrity. The bullet of the cartridge shall not burst either in its passage through the barrel or in flight; neither shall the jacket of the bullet nor any part thereof strip from the other bullet components when the cartridge is fired.

3.15 Action time. The mean action time plus five standard deviations shall not exceed 3 milliseconds. Action time is defined as the sum of the primer ignition time, propellant burning time, and the time taken by the bullet to reach the gas port.

3.16 Airtightness of base closure seal. The bullet shall not release more than one bubble of air when subjected to an internal pressure differential of two pounds per square inch (psi) for 5 seconds.

3.17 First article. When specified in the contract or purchase order (see 6.2), a sample shall be subjected to first article inspection in accordance with the technical provisions herein (see 4.4) .

3.18 Workmanship. The requirements for workmanship shall be as specified on applicable drawings, referenced specifications and in accordance with the following:

a. Metal defects The cartridge shall be free of metal defects which include: but are not limited to: folds, wrinkles, scratches, scaly metal, dents, perforations, and other discontinuities.

b. Foreign matter. The cartridge shall be free of corrosion, stains, discolorations, dirt, and smears of lacquer.

c. Cleaning. Cleaning methods used shall not be injurious to any part, nor shall the parts be contaminated by any cleaning agent.

d. Contamination of explosive components. Extreme care shall be exercised to avoid contamination of primers and propellant by oil, grease, or other foreign matter.

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4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility or inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) 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 this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of Sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.1.2 General provisions. Unless otherwise specified herein, the provisions of MIL-A-48078 apply and form a part of this specification. Reference shall be made to MIL-STD-109 to define quality assurance terms used herein.

4.2 Inspection equipment. Shall comply with MIL-A-48078 (Inspection Equipment) and MIL-A-2550 (Test and measuring equipment).

4.3 Classification of inspections The inspection requirements specified herein are classified as follows:

a. First article inspection (see 4.4).

b. Quality conformance inspection (See 4.5).

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4.4 First article inspection.

4.4.1 Submission. The contractor shall submit a first article sample as designated by the Contracting Officer for evaluation in accordance with provisions of 4.3.2. The first article sample shall consist of the assemblies, components and test specimens listed below in the quantities indicated.

Name	Drawing	Quantity
Cartridge, 5.56mm, Tracer, M856	9342865	10,000
Bullet, Tracer, 5.56mm	9342866	25
Filler, Point	9349660	25
Jacket, pointed	9357839	25

4.4.2 Inspections to be performed. As determined by the Government,the first article assemblies, components, and test specimens may be subjected to any or all of the examinations and tests specified in Table I and to any or all requirements of the applicable drawings.

4.4.3 Rejection. If any assembly, component or test specimen fails to comply with any of the applicable requirements the first article sample shall be rejected. The Government reserves the right to terminate inspection upon any failure of an assembly, component or test specimen to comply with any of the requirements.

TABLE I. First article inspection.

CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET 1 OF 4	DRAWING NUMBER 9357839
	Jacket, Pointed		NEXT HIGHER ASSEMBLY 9342866

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
	Diameter	25, 0-1	3.2	Standard Measurement Test Equipment (SMTE)
	Base thickness	25, 0-1	3.2	SMTE
	Wall thickness	25, 0-1	3.2	SMTE
	Wall thickness variation (2 locations)	25, 0-1	3.2	SMTE
	Improper weight	25, 0-1	3.2	Balance
	Evidence of poor workmanship	25, 0-1	3.2	Visual

NOTES:

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TABLE II. First article inspection.

CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET 2 OF 4	DRAWING NUMBER 9349660
	Filler, Point		NEXT HIGHER ASSEMBLY 9357839

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
	Improper weight	25, 0-1	3.2	Balance
	Evidence of poor workmanship	25, 0-1	3.2	Visual

NOTES:

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TABLE I. First article inspection.

CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE Bullet	SHEET 3 OF 4	DRAWING NUMBER 9342866
			NEXT HIGHER ASSEMBLY 9342865

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
	Diameter of bullet	25, 0-1	3.2	Gage
	Length of bullet	25, 0-1	3.2	Gage
	Concentricity of bullet tip (at the proper location) to bullet diameter	25, 0-1	3.2	Gage
	Bullet tip, width	25, 0-1	3.2	Gage
	Distance from bullet tip to cannelure	25, 0-1	3.2	Gage
	Diameter of cannelure	25, 0-1	3.2	Gage
	Damaged cannelure	25, 0-1	3.2	Visual
	Ogive radius	25, 0-1	3.2	Gage
	Improper weight	25, 0-1	3.2	Balance
	Presence of closure cup	25, 0-1	3.2	Visual
	Exposed steel (clad jacket) (29)	25, 0-1	3.2	Visual
	Evidence of poor workmanship	25, 0-1	3.2	Visual

NOTES:
Numbers after defect descriptions refer to visual defect standards in MIL-STD-636 (NATO Caliber 7.62mm Section).

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TABLE II. First article inspection.

CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE			DRAWING NUMBER
	Cartridge, 5.56mm, Tracer, M856		SHEET 4 OF 4	9342865
				NEXT HIGHER ASSEMBLY
CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
	Examination of Defects			
	Critical	10,000, 0-1	3.1	4.5.6
	Major	119, 0-1	3.1	4.5.6
	Minor	39, 0-1	3.1	4.5.6
	Tests			
	Bullet extraction (Note 1)	75, 2-3	3.3	4.6
	Waterproofness	50, 3-10 150, 9-10	3.5	4.6
	Residual stress (Note 1)	150, 1-2	3.4	4.6
	Airtightness of base closure seal	50, 2-3	3.16	4.6
	Hardness (head)	10, 0-1	3.1	4.6
	Hardness (sidewall)	10, 0-2 30, 1-2	3.1	4.6
	Ballistics Tests (see 4.5.7)		3.6 to 3.15	4.6

NOTES:

1. No retest permitted during First Article Test.

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4.5 Quality conformance inspection.

4 .5.1 Lot formation. Lot formation shall comply with MIL-A-48078.

4.5.2 Lot submission. The product shall be submitted in accordance with MIL-A-48078.

4.5.3 Component parts. Unless otherwise specified, component lots shall be homogeneous and of a size convenient to the contractor and shall be inspected, tested and accepted by the contractor. The cartridge lot shall not contain:

a. Cartridge cases from more than one manufacturer or process.

b. Primers from more than one lot interfix number from one manufacturer.

c. Bullets from more than one manufacturer.

d. Bullets from more than one process.

e. Propellant from more than two lots.

f. Propellant from more than one manufacturer.

4.5.4 Lot identification. Each lot of ammunition shall be identified as to type, caliber and model, and shall incorporate a lot number in accordance with MIL-STD-1168.

4.5.5 Inspections to be performed. Inspection shall be as specified in 4.5.6 (Examination and tests) and the Quality Conformance Testing Table.

4.5.6 Examinations and tests.

a. Classification of characteristics. Quality conformance examinations and tests are specified in the following Classification of Characteristics paragraphs. The contractor's quality program or detailed inspection system shall provide assurance of compliance of all characteristics with the applicable drawing and specification requirements utilizing as a minimum the conformance criteria specified. When cited herein, attributes sampling inspection shall be conducted in accordance with Table II below, using the inspection levels stated in the Classification of Characteristics paragraphs. Examination shall be visual or by means of a Government approved automated inspection system such as optical, mechanical or electrical. All

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non-conforming cartridges shall be rejected. If a visual critical defect is found in a sample either just prior to a firing test or after a firing test (and the defect is not due to the firing), the lot shall be rejected.

TABLE II. Attributes sampling inspection.

Lot Size	Inspection Levels	
	I	II
91 to 150	50	12
151 to 280	50	19
281 to 500	50	21
501 to 1,200	75	27
1,201 to 3,200	116	35
3,201 to 10,000	116	38
10,001 to 35,000	135	46
35,001 to 150,000	170	56
150,001 to 500,000	200	64
500,001 and over	244	64

Numbers under inspection levels indicate sample size; Accept on zero and reject on one or more for all inspection levels.

b. Alternative quality conformance provisions. Unless otherwise specified herein or provided for in the contract, alternative quality conformance procedures, methods or equipment, such as statistical process control, tool control, other types of sampling plans, etc., may be used by the contractor when they provide, as a minimum, the level of quality assurance required by the provisions herein. Prior to applying such alternative procedures, methods or equipment, the contractor shall describe them in a written proposal submitted to the Government for evaluation (see 6.9). When required, the contractor shall demonstrate that the effectiveness of each proposed alternative is equal to or better than the specified quality conformance provisions(s) herein. In case of dispute as to whether the contractor's proposed alternative(s) provides equivalent assurance, the provisions of this specification shall apply. All approved alternative provisions shall be specifically incorporated into the contractor's quality program or inspection system, as applicable.

QUALITY CONFORMANCE INSPECTION

CLASSIFICATION OF CHARACTERISTICS

MIL-C-63990C (AR)

PARAGRAPH	TITLE		DRAWING NUMBER
4.5.6.1	Cartridge, 5.56mm, Tracer, M856 (Inspection)	SHEET 1 OF 3	9342865
			NEXT HIGHER ASSEMBLY: Not applicable.

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
Critical				
1.	Perforated case (6)	100%	3.1	Gage
2.	Case split in K, L or M location (7)	100%	3.1	Gage
3.	Weight min (see Note 1)	100%	3.1	See Note 2
Special				
a.	Primer missing (32)	100%	3.1	Visual
b.	Primer cocked (33)	100%	3.1	Visual
c.	Primer inverted (34)	100%	3.1	Visual
Major				
101.	Total length	Level I	3.1	Gage
102.	Case split in I, S, or J location (6)	Level I	3.1	Visual
103.	Corrosion or stain with etching (2)	Level I	3.1	Visual
104.	Chamfer missing on head (rim) (13)	Level I	3.1	Visual
105.	Case mouth not crimped in cannelure (11)	Level I	3.1	Visual
106.	No evidence of mouth anneal (21)	Level I	3.1	Visual
107.	Draw scratch (8)	Level I	3.1	Visual
108.	Split bullet jacket (24)	Level I	3.1	Visual
109.	Loose bullet (25)	Level I	3.1	Visual
110.	Loose primer (35)	Level I	3.1	Visual

NOTES:

1. Each lightweight cartridge shall be disassembled and the propellant weighed. Any cartridge containing less than 13 grains of propellant shall be classed as a critical defect. Any cartridge containing 13 grains or more of propellant shall be classed as a major defect.

2. One hundred percent examination for weight may be either by weighing or by measuring for propellant fill; method used must be capable of detecting a cartridge containing less than 13 grains of propellant.

AMSMC Form 1570a-E, 1 Jul 89 Replaces AMSMC Form 1570a, 1 Apr 85, which may not be used.

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QUALITY CONFORMANCE INSPECTION

CLASSIFICATION OF CHARACTERISTICS

MIL-C-63990C (AR)

PARAGRAPH	TITLE		DRAWING NUMBER
4.5.6.1	Cartridge, 5.56mm, Tracer, M856 (Inspection)	SHEET 2 OF 3	9342865
			NEXT HIGHER ASSEMBLY: Not applicable.

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
Major				
111.	Scaly metal (12)	Level I	3.1	Visual
112.	Profile and alignment	Level I	3.1	Gage
113.	Diameter of head	Level I	3.1	Gage
114.	Thickness of head	Level I	3.1	Gage
115.	Length to shoulder datum diameter	Level I	3.1	Gage
116.	Depth of primer	Level I	3.1	Gage
117.	Diameter of extractor groove, max	Level I	3.1	Gage
118.	NATO mark missing or illegible	Level I	3.1	Visual
119.	Dent (5)	Level I	3.1	Visual
Minor				
201.	Discolored, dirty, oily, or smeared (1)	Level II	3.1	Visual
202.	Case dented (5)	Level II	3.1	Visual
203.	Scaly metal on case (12)	Level II	3.1	Visual
204.	Fold, wrinkle, buckle or bulge in case (14, 15, 16, 17)	Level II	3.1	Visual

NOTES:

3. Refer to MIL-STD-636 (NATO Caliber 7.62mm Section) for visual defect standards for defects 1 through 38. Inspection for visual defects may be performed employing an automated inspection system that has been approved by the Government. In the event of a conflict between this specification and MIL-STD-636 as to defect classification, the classification specified in this specification shall apply.

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CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET 3 OF 3	DRAWING NUMBER
4.5.6.1	Cartridge, 5.56mm, Tracer, M856 (Inspection)		9342865
			NEXT HIGHER ASSEMBLY: Not applicable.

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
Minor				
205.	Head stamp missing or illegible (18)	Level II	3.1	Visual
206.	Defective head (19)	Level II	3.1	Visual
207.	Defective mouth (20)	Level II	3.1	Visual
208.	Bullet dented (22)	Level II	3.1	Visual
209.	Bullet scratched (23)	Level II	3.1	Visual
210.	Scaly metal on bullet (27)	Level II	3.1	Visual
211.	Upset (crooked) point (28)	Level II	3.1	Visual
212.	Blunt point (30)	Level II	3.1	Visual
213.	Defective cannelure (31)	Level II	3.1	Visual
214.	Nicked or dented primer (36)	Level II	3.1	Visual
215.	No waterproofing material (primer pocket joint) (37)	Level II	3.1	Visual
216.	Defective crimp (28)	Level II	3.1	Visual
217.	Scratch (case) (9)	Level II	3.1	Visual
218.	More than 50% missing or improper color of bullet tip	Level II	3.1	Visual
219.	Extractor groove diameter undersize	Level II	3.1	Gage
220.	Draw scratch (8)	Level II	3.1	Visual
221.	Workmanship	Level II	3.18	Visual

NOTES:

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CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET 1 OF 1	DRAWING NUMBER
4.5.6.2	Cartridge, 5.56mm, Tracer, M856 (Testing)		NEXT HIGHER ASSEMBLY

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
Critical	None defined.			
Major				
101.	Bullet extraction	25, 0-3 75, 2-3	3.3	4.6
102.	Airtightness of base closure seal (see Note 1)	25, 3-7 75, 7-8	3.16	4.6
103.	Waterproofness	50, 3-10 150, 9-10	3.5	4.6
104.	Residual stress	50, 0-2 150, 1-2	3.4	4.6
105.	Hardness (head)	10, 0-1	3.1	4.6
106.	Hardness (sidewall)	10, 0-2 30, 1-2	3.1	4.6
107.	Ballistics Tests (see 4.5.7)			
Minor	None defined.			

NOTES:
1. The bullets from the bullet extraction test shall be used for this test.

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4.5.7 Ballistic testing. The ballistic tests are specified in Table III. Firing defects are specified in Table IV. Tests shall be conducted as specified in SCATP-5.56mm (Heavy Bullet).

samples for the various tests.

TABLE III. Ballistic test samples temperatures.

TEST	AMBIENT	70 ± 2	-65 ± 5	+125 ± 2	REQUIREMENT PARAGRAPH
Action Time [1]		20	20	20	3.10 & 3.15
Velocity [1]		20	20	20	3.6 & 3.10
Chamber press [1]		20	20	20	3.7 & 3.10
Port press [1]		20	20	20	3.8 & 3.10
M249 Function & Casualty [2]	400		200	200	3.12
M16A2 Function & Casualty [2]	400		200	200	3.12
Accuracy at 600 yards [3]	90				3.11
Fouling [4]	800		400	400	3.13
Trace [5]	400				3.9
Bullet Integrity [6]	200				3.14

NOTES:

1 Failure of the cartrridges in any sample to comply with the applicable requirements shall be cause for rejection of the lot subject to testing of a second sample consisting of double the quantity of cartridges used in the first test for the temperature or temperatures at which the failure occurred. The lot shall be rejected if the cartridges in the second sample fail to comply with the applicable requirements. Action time, chamber pressure and port pressure tests shall be conducted simltaneously with velocity

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[2]The acceptance and retest numbers of Table IV shall be applied to the M249 results (all temperatures combined) and the M16A2 results (all temperatures combined) individually. All Function and Casualty defects observed in other ballistic tests shall be included in both the M249 and M16A2 defect counts in the evaluation. When either weapon test is failed and a retest is permitted by Table IV, both weapon tests shall be repeated with sample sizes doubled. The cumulative (lst and 2nd test combined) defect count shall be evaluated against the cumulative acceptance criteria of Table IV for both the M249 and M16A2 individually.

[3]Three 30-round targets shall be fired. A retest is permitted whereby the results of the first test are excluded and six 30-round targets are fired, averaged and checked for compliance with the requirements. Only one target miss is permitted out of all "Valid Targets" as defined in SCATP-5.56mm (Heavy Bullet).

[4]The sample for this test shall be the sample specified for the Function and Casualty test for each respective weapon, i.e., 800 rounds for the M249 and 800 rounds for the M16A2.

[5]Four separate tests shall be conducted: M16A2 Day, M16A2 Night, M249 Day, and M249 Night. Each individual test must meet 100-20-36. Each individual test is permitted a 100-round retest whereby the accept/reject criteria for the cumulative sample of 200 rounds is 200-35-36. Trace signatures identified as dim at the 2950 ft observation point shall not be scored as defects.

[6]The two hundred round sample shall be composed of the following:

a. One hundred rounds from the M249 Function and Casualty test.

b. Sixty rounds from the M16A2 Function and Casualty test : 3 round burst mode.

c. Forty rounds from the M16A2 Function and Casualty test: single shot mode.

Failure of four or more bullets (from the total sample) to comply with the applicable requirements shall be cause for rejection of the lot. If more than one but less four

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bullets fail in the first test, a second sample of 200 cartridges shall be tested in different M249 and M16A2 weapons than were used in the first test. The lot shall be rejected if in the combined first and second sample, four Or more bullets fail to comply with the applicable requirements.

4.5.7.2 Function and casualty defects in ballistic tests. For any ballistic test, except function and casualty, where the occurrence of a firing defect prevents the obtaining of a valid result for the characteristic being tested the following shall apply:

a. The defect shall be recorded under the appropriate function and casualty defect category and included in the defect count for determining acceptance or rejection in accordance with Table IV.

b. The particular test for which the round was fired shall not be penalized.

c. A replacement round shall be fired to obtain the data for the characteristic being tested.

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TABLE IV. Function and casualty defect classification and accept/reject criteria.

DEFECT	FIRST SAMPLE ACCEPT/REJECT		CUMULATIVE ACCEPTANCE NO.
1. Misfire [1]			
a. No vent hole, or obstruction in the vent area [2]	0	1	-
b. Other	1	3	2
2. Bullet remaining in bore [2]	0	1	
3. Primer leaks:			
a. Perforation of firing pin indent in primer cup			
(1) M249 Machine Gun	0	See [3]	1
(2) M16A2 Rifle	0	See [3]	1
b. Escape of gas through primer cup (excluding 3a above)	1	3	2
c. Escape of gas around primer cup			
(1) 50% or more than 50% of periphery	3	7	9
(2) Less than 50% of periphery	5	9	13
d. Blown primer - Primer separates from casehead and primer pocket is grossly distorted. [2]	0	1	-
e. Dropped primer - Primer falls out of pocket upon retraction of bolt.	0	2	1
f. Loose primer - Primer remains in pocket, but is physically loose.	0	2	2

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TABLE IV. Function and casualty defect classification and accept/reject criteria. (continued)

DEFECT	FIRST SAMPLE ACCEPT/REJECT		CUMULATIVE ACCEPTANCE NO.
4. Case casualties			
a. Longitudinal split [4]			
(1) Neck and shoulder (I or S)	5	9	13
(2) Body (J)	3	7	9
(3) Body (K)	0	2	1
(4) To head (L)	0	2	1
(5) Through head (M)	0	2	1
b. Circumferential rupture [4]			
(1) Partial, shoulder or body (J and S)	1	3	2
(2) Partial, body (K) [2]	0	1	-
(3) Partial, head (L) [2]	0	1	-
(4) Complete [2]	0	1	-
5. Failure to extract	0	2	1
6. Weapon stoppage [5]	0	2	1

NOTES:

[1]Each cartridge that misfires shall be disassembled and examined for presence of vent hole in primer pocket, or any obstruction in the vent hole area of the primer pocket that can be assignable as the cause for misfire. If the vent hole is missing or obstructed, the lot shall be rejected with no second sample permitted.

[2]No second sample permitted. Lot shall be rejected.

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[3] If one or more defects are found in the first sample, a second sample shall be fired in both weapons. The second sample shall consist of double the quantity of cartridges specified under function and casualty of Table III for each weapon. Prior to the testing of the second sample, the firing pin of the specific weapon(s) in which the defect originally occurred shall be replaced with a new firing pin. If an additional primer perforation is found in the second sample, the lot shall be rejected.

[4] For location of defects indicated by letters in parentheses, see Drawing C7643674.

[5] All stoppages attributable to the ammunition, with the exception of misfire, complete rupture or failure to extract, observed in all tests shall be included.

4.5.8 Packaging, Packing and marking inspection. During or immediately prior to the packaging operation, 100% examination of the cartridges shall be performed to ascertain that the lot does not contain a blank cartridge or a cartridge with the bullet missing. Examination shall be visual or by means of a Government approved inspection system. All non- conforming cartridges shall be removed from the lot. A sample of 244 shall be selected from each lot and examined for the presence of a high pressure test, dummy or blank cartridge, or a cartridge with the bullet missing. If a high pressure test, dummy or blank cartridge, or a cartridge with the bullet missing is found, the lot shall be rejected. Any occurrence of a high pressure test, dummy or blank cartridge, or a cartridge with the bullet missing after this inspection shall cause the lot to be rejected. Inspection for packaging, packing and marking shall be in accordance with MIL-STD-644 as applicable to the drawing.

4.5.9 Inspection equipment. The inspection equipment required to perform the inspections specified herein is identified in the “Inspection Method Reference” column of the Classification of Characteristics listings starting with 4.4.2.1. Contractor inspection equipment designs shall be submitted for Government approval as specified in the contract. Designs which provide variable measurements instead of attributes data are preferred in order to facilitate the use of statistical process control. See MIL-A-48078 and 6.3 herein.

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4.6 Methods of inspection. The following tests shall be conducted in accordance with the test procedure document, SCATP-5.56MM (Heavy Bullet):

- Bullet extraction
- Waterproof
- Residual stress
- EPVAT
  - Chamber pressure
  - Port pressure
  - Velocity
  - Action time
- Temperature stability
- Function and casualty
- Fouling
- Bullet integrity
- Accuracy
- Trace

4.6.1 Hardness testing. The bullets shall be extracted, the propellant removed and the primers extracted. Each cartridge case of the sample shall be prepared and placed on the appropriate test fixture for testing in accordance with ASTM Method E 92.

4.6.1.1 Case sidewall. The average of the hardness values of the sample cases for each prescribed point along the sidewall exterior surface shall be computed and recorded in accordance with the drawing requirements.

4.6.1.2. Case head The individual hardness value for each prescribed point on the head section section of each sample case shall be recorded. Any value failing to meet the drawing requirement at a prescribed point(s) shall be cause for measurement of hardness at the corresponding point(s) on the opposite side of the primer pocket of the same head section from which the initial value was obtained. The higher of the Two measurements shall be recorded as the value of record for determination of conformance to drawing requirements.

5. PACKAGING

5.1 Packing - Level A.(Worldwide shipment)-The cartridges shall be packed in accordance with Drawing 12551963 or 12590217.

5.2 Marking and labeling. Packing boxes shall be marked and labeled in accordance with the applicable drawing cited in 5.1.

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6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The components components covered by this specification are intended for use in the cartridge, 5.56mm, tracer, M856.

6.2 Acquisisttion requirements Acquisition documents must specify the following:

a. Title, number and date of this specification.

b. Issue of DODISS to be cited in the solicitation, and, if required, the specific issue of individual documents referenced (see 2.1.1).

c. Requirements for submission of first article sample.

d. Type and level of packing (see 5.1).

e. Provision for submission of Inspection Equipment Designs.

f. Provision for submission of detailed inspection plan for the cartridge (see 6.7).

g. Provisions for submission of acceptance inspection results for each lot of ammunition presented to the Government (see 6.6).

6.3 Submission of contractor inspection equipment designs for approval. Submit copies of designs as required to: Commander, U.S. Army ARDEC, ATTN: SMCAR-QAF-I, Picatinny Arsenal, NJ 07806-5000. This address will be specified on the Contract Data Requirements List, DD Form 1423 in the contract.

6.4 Hazard notice. The cartridge described herein and some of its components are flammable or explosive and consequently present hazards in manufacture,handling, storage and shipment The contractor should recognize these hazards and take appropriate measure to prevent fire,explosion, adverse environment rough handling, corrosive atmosphere, or electrically iduced incidents. Such measures shall include the employment of an effective safety program that addresses the inherent hazards associated with the cartridge.

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6.5 Drawings. Drawings listed in Section 2 of this specification under the heading U.S. Army Armament, Research, Development and Engineering Center (ARDEC) may also include drawings prepared by, and identified as U.S. Army Armament, Research and Development Command (ARRADCOM), Frankford Arsenal, Rock Island Arsenal or Picatinny Arsenal drawings. Technical data originally prepared by these activities is now under cognizance of ARDEC.

6.6. Submission of test data.In addition to the normal distribution of records, when the cartridge is procured by the U.S. Army,one (1) copy of all ballistic data and the ammunition data card for each lot should be forwarded to: Commander, ARDEC, ATTN: SMCAR-QAF-S, Picatinny Arsenal, NJ 07806-5000.

6.7 Submission of detailed inspection 6.7 plan for review. The detailed inspection plan for the cartridge should be submitted to. the responsible U.S. Government quality assurance element.

6.8 Subject term (key word) listing.

Ammunition
Bullet
Small Arms
Testing

6.9 Submission of alternative quality conformance provisions .Unless otherwise specified inthe contract, proposed alternative quality conformance provisions will be submitted by the contractor for evaluation by the technical activity responsible for the preparation of this specification.

6.10 Changes from previous issue. Asterisks (or vertical) lines) are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodian:
Army-Al?

Preparing activity:
Army-AR

(Project 1305-AE81)

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I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER	2. DOCUMENT DATE (YYMMDD)
	MIL-C-63990C (AR)	940215

3. DOCUMENT TITLE: CARTRIDGE, 5.56MM TRACER, M586

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets if needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial	(2) AUTOVON

8. PREPARING ACTIVITY

a. NAME	b. TELEPHONE (Include Area Code)	
U.S ARMY ARDEC STANDARDIZATION OFFICE	(1) Commercial 201-724-6675	(2) AUTOVON DSN-880-6675
c. ADDRESS (Include Zip Code) ATTN: SMCAR-BAC-S PICATINNY ARSENAL, NJ 07806-5000	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	

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