

MIL-C-63990B (AR)  
 18 April 1986  
 SUPERSEDING  
 MIL-C-63990A (AR)  
 5 October 1984

## MILITARY SPECIFICATION

### CARTRIDGE, 5.56MM TRACER, M856

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

#### 1. SCOPE

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

#### 2. APPLICABLE DOCUMENTS

##### 2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

#### SPECIFICATIONS

##### MILITARY

MIL-A-2550	- Ammunition, General Specification for
MIL-I-45607	- Inspection Equipment, Acquisition Maintenance and Disposition of
MIL-A-48078	- Ammunition, Standard Quality Assurance Provisions, General Specification for
MIL-C-70460	- Cartridge, 5.56mm, Ball, (Heavy Bullet) Reference

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, US Army Armament Research and Development Center, Attn: AMSMC-QA, Dover, New Jersey 07801-5001 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 130

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## STANDARDS

## MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
- 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
- MIL-STD-1168 - Lot Numbering of Ammunition

2.1.2 Other Government documents, drawings and publications.

The following other Government documents, drawings and publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issue shall be those in effect on the date of the solicitation.

## DRAWINGS

## US 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
- 9342867 - Tracer Composition R-528
- 9349659 - Jacket
- 9349660 - Filler, Point
- 9357841 - Cartridge, 5.56mm, Ball, (Heavy Bullet) Reference
- 10522419 - Igniter I-194

## INSPECTION EQUIPMENT

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

## PACKAGING &amp; MARKING

- 9345240-2 - Pkg & Mkg: Crtgs, 5.56mm; Cartons; Box, Ammo, M2A1; Box, WRBND
- 9354586 - Pkg & Mkg: Crtgs, 5.56mm; Linked; SAW, M249 Ammo Mag; Box, Ammo, M2A1; Box, WRBND

## PUBLICATIONS

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

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(Copies of specifications, standards, handbooks, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.1.3 Other publications. The following document(s) form a part of this specification to the extent specified herein. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable.

## 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, Pennsylvania 19103.)

2.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

## 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 Materials. 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  $70^{\circ} \pm 2^{\circ}\text{F}$ , shall be 2990 feet per second (fps) plus or minus 40 fps at 78 feet from the muzzle of the weapon. The standard deviation of the velocities shall not exceed 40 fps.

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3.7 Chamber pressure. The average chamber pressure of the sample cartridges, conditioned at  $70^{\circ} \pm 2^{\circ}\text{F}$  shall not exceed 55,000 psi. Neither the chamber pressure of an individual sample test cartridge or 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 12,400 psi for sample cartridges conditioned to  $70^{\circ} \pm 2^{\circ}\text{F}$ .

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 should begin at a range not greater than 230 (76.7 yards, 70 meters) feet from the muzzle of the weapon and should continue to a minimum range of 2,950 feet (983.3 yards, 900 meters).

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  $125^{\circ} \pm 2^{\circ}\text{F}$  for not less than one hour and fired at that temperature.

b. Conditioned at  $-65^{\circ} \pm 5^{\circ}\text{F}$  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  $70^{\circ} \pm 2^{\circ}\text{F}$ . 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  $70^{\circ} \pm 2^{\circ}\text{F}$  by more than 7,000 psi. The average chamber pressure of the sample cartridges conditioned at  $125 \pm 2^{\circ}\text{F}$  shall not exceed 60,000 psi. Any decrease 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  $70^{\circ} \pm 2^{\circ}\text{F}$ , but not to be less than 11,400 psi.

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

3.11 Accuracy and matching (600 yards).

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

3.11.2 Matching. The mean point of impact of the test cartridges at 600 yards shall not deviate above or below the mean point of impact of the reference cartridge in a vertical direction, by more than 10.8 inches. (Note: A reference round shall be in accordance with Dwg. 9357841 and shall have passed the testing criteria of MIL-C-70460)

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  $125^{\circ} \pm 2^{\circ}\text{F}$  for not less than one hour and fired at that temperature.

b. Conditioned at  $-65 \pm 2^{\circ}\text{F}$  for not less than one hour and fired at that temperature.

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.

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3.17 First article test. When specified in the contract or purchase order, a sample shall be subjected to first article inspection (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 includes, but is 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.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements specified herein. Except as otherwise specified in the contract or purchase order, the contractor may utilize his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must 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 assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

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

4.3 Classification of inspection. The following types of inspection shall apply:

- a. First article inspection
- b. Quality conformance inspection

4.4 First article inspection.

4.4.1 First article sample. The sample shall be manufactured using the same materials, equipment, processes and procedures as will be used in regular production. All parts and materials shall be the same as used for regular production and shall be obtained from the same source of supply. The contractor shall submit a first article sample as designated by the Contracting Officer for evaluation in accordance with the provisions of 4.4.2. The first article sample shall consist of the following items in sample quantities indicated.

<u>Part Description</u>	<u>Drawing</u>	<u>Quantity</u>
Cartridge, 5.56MM, Tracer, M856	9342865	10,000
Bullet, Tracer, 5.56mm	9342866	25
Filler, Point	9349660	25
Jacket	9349659	25

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

4.4.3 Rejection of first article sample. The first article sample shall be rejected if any of the criteria specified in 4.4.2 is not met. MIL-A-48078 (Rejection) shall apply.

TABLE I. First article inspection

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**CLASSIFICATION OF DEFECTS & TESTS**

PARAGRAPH	TITLE	SHEET 1 OF 2		DRAWING NUMBER See Below				
		EXAMINATION OR TEST	NO. OF SAMPLE UNITS		AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD	
	Cartridge, 5.56MM, Tracer, M586 and Components							
	<u>Bullet, Tracer, 5.56MM (Dwg. 9342866)</u>							
	Examination for defects		25	100%	3.2	4.5.6		
	<u>Filler, Point (Dwg. 9349660)</u>							
	Examination for defects		25	100%	3.2	4.5.6		
	<u>Jacket (Dwg. 9349659)</u>							
	Examination for defects		25	100%	3.2	4.5.6		
	<u>Cartridge, 5.56MM, Tracer, M856 (Dwg. 9342865)</u>							
	Examination for defects		500	1/	3.2	4.5.6		
<b>NOTES</b>	1/ Same as cartridge inspection in Table II.							

AMSMC Form 1570, 1 Feb 85

Replaces DRSMC-QA (D) Form 160, 1 Aug 83, which may not be used.



TABLE I. First article inspection

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**CLASSIFICATION OF DEFECTS & TESTS**

PARAGRAPH	TITLE	SHEET 2 OF 2		NO. OF SAMPLE UNITS	EXAMINATION OR TEST	AQL OR 100%	REQUIREMENT PARAGRAPH	DRAWING NUMBER 9342865 NEXT HIGHEN ASSEMBLY	PARAGRAPH REFERENCE / INSPECTION METHOD
	Cartridge, 5.56MM, Tracer, M856			75	Bullet extraction	2-3	3.3	4.6	
				50 150	Waterproofness	3-10 9-10	3.5	4.6	
				150	Residual stress	1-2	3.4	4.6	
				50	Airtightness of base closure seal	2-3	3.16	4.6	
				10	Hardness (head)	0-1	3.1	4.6	
				10 30	Hardness (sidewall)	0-2 1-2	3.1	4.6	
					BALLISTICS TESTS (see Table III)		3.6 to 3.15	4.6	

NOTE:

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4.5 Quality conformance inspection.

4.5.1 Lot formation. In accordance with MIL-A-48078.

4.5.2 Lot submission. The product shall be submitted in accordance with MIL-STD-105.

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

a. Cartridge cases from more than one manufacturer.

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

c. Bullets from more than one interfix number from one manufacturer.

d. Propellant from more than two lots and more than one manufacturer.

4.5.4 Lot identification. Each lot of ammunition shall be identified as to type, caliber and model, as well as 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 for defects) and the Quality Conformance Testing Table paragraphs 4.5.6.1 through 4.5.6.4.

4.5.6 Examination for defects.

a. Major and minor defects. Examination for major and minor defects shall be performed on a class basis or individual basis as specified in 4.5.6.1 through 4.5.6.4 using applicable sampling plans and acceptance criteria of MIL-STD-105, and Acceptable Quality Level (AQL) specified. All non-conforming cartridges (or components) shall be rejected.

b. Critical defects. Unless otherwise specified, one hundred percent examination shall be performed for all critical defects. 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. The lot shall then be rescreened and resubmitted for visual inspection for critical defects. If a critical defect is found during packing, the portion of the lot that has been packed or is in the process of being packed shall be rejected. In addition, the portion of the lot remaining to be packed shall be rejected. The lot shall then be rescreened and resubmitted for visual inspection of critical defects.

QUALITY CONFORMANCE INSPECTION

**CLASSIFICATION OF DEFECTS & TESTS**

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PARAGRAPH	TITLE	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	SHEET 1 OF 1		DRAWING NUMBER 9349659
				AQL OR 100%	REQUIREMENT PARAGRAPH	
CATEGORY				AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
4.5.6.1	Jacket					NEXT HIGHER ASSEMBLY 9357839
<u>Critical:</u>	None defined.					
<u>Major:</u>	(Individual AQLs)					
101.	Diameter			1.50%	3.2	SMTE
102.	Base thickness			1.50%	3.2	SMTE
103.	Wall thickness			1.50%	3.2	SMTE
104.	Wall thickness variation (2 locations)			1.50%	3.2	SMTE
105.	Improper weight			1.50%	3.2	Balance
<u>Minor:</u>	(Individual AQLs)					
201.	Evidence of poor workmanship			2.50%	3.2	Visual
<u>NOTE:</u>						

CLASSIFICATION OF DEFECTS & TESTS

PARAGRAPH	TITLE	SHEET 1 OF 1		DRAWING NUMBER 9349660
		EXAMINATION OR TEST	NO. OF SAMPLE UNITS	
CATEGORY		AQL OR 100%		NEXT HIGH ASSEMBLY 9349659
<u>Critical:</u>	None defined.			PARAGRAPH REFERENCE / INSPECTION METHOD
<u>Major:</u>	(Individual AQLs)			
101.	Improper weight	1.50%	3.2	Balance
<u>Minor:</u>	(Individual AQLs)			
201.	Evidence of poor workmanship	2.50%	3.2	Visual
<b>NOTE:</b>				

QUALITY CONFORMANCE INSPECTION

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**CLASSIFICATION OF DEFECTS & TESTS**

PARAGRAPH	TITLE	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	SHEET 1 OF 1		DRAWING NUMBER
				AQL OR 100%	REQUIREMENT PARAGRAPH	
CATEGORY						NEXT HIGHER ASSEMBLY
						PARAGRAPH REFERENCE / INSPECTION METHOD
4.5.6.3	Bullet					9342866
						9342865
<u>Critical:</u>	None defined.					
<u>Major:</u>	(Individual AQLs)					
101.	Diameter of bullet			1.50%	3.2	Gage
102.	Length of bullet			1.50%	3.2	Gage
103.	Concentricity of bullet tip (at the proper location) to bullet diameter			1.50%	3.2	Gage
104.	Bullet tip, width			1.50%	3.2	Gage
105.	Distance from bullet tip to cannellure			1.50%	3.2	Gage
106.	Diameter of cannellure			1.50%	3.2	Gage
107.	Damaged cannellure			1.50%	3.2	Visual
108.	Ogive radius			1.50%	3.2	Gage
109.	Improper weight			1.50%	3.2	Balance
110.	Presence of closure cup			1.50%	3.2	Visual
<u>Minor:</u>	(Individual AQLs)					
201.	Exposed steel (clad jacket) (29)			2.5%	3.2	Visual
202.	Evidence of poor workmanship			2.50%	3.2	Visual
<u>Note:</u>	Numbers after defect descriptions refer to visual defect standards in MIL-STD-636 (NATO Caliber 7.62mm Section).					

QUALITY CONFORMANCE INSPECTION

CLASSIFICATION OF DEFECTS & TESTS

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PARAGRAPH	TITLE	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	SHEET	1 OF 4	DRAWING NUMBER	NEXT HIGHER ASSEMBLY	PARAGRAPH REFERENCE / INSPECTION METHOD
4.5.6.4	Cartridge, 5.56MM, Tracer, M856 (Inspection)						9342865	Not applicable	
<b>Critical</b>									
1.	Perforated Case (6)			100%					Visual
2.	Case split in K, L or M location (7)			100%					Visual
3.	Primer missing (32)			100%					Visual
4.	Primer cocked (33)			100%					Visual
5.	Primer inverted (34)			100%					Visual
6.	Weight min <u>1</u>			100%					Balance
<b>Major</b>									
101.	Total length								Gage
102.	Case split in I, S, or J location (6)								Visual
103.	Corrosion or stain with etching (2)								Visual
104.	Chamfer missing on head (rim) (13)								Visual
<b>NOTES:</b>	<p><u>1</u>/ Each lightweight cartridge shall be disassembled and the propellant weighed. Any cartridge containing less than 10 grains of propellant shall be classed as a critical defect. Any cartridge containing 10 grains or more of propellant shall be classed as a major defect. Numbers after defect descriptions refer to visual defect standards in MIL-STD-636 (NATO Caliber 7.62MM Section).</p>								

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**CLASSIFICATION OF DEFECTS & TESTS**

PARAGRAPH	TITLE	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	SHEET 2 OF 4		DRAWING NUMBER 9342865
				AQL OR 100%	REQUIREMENT PARAGRAPH	
4.5.6.4	Cartridge, 5.56MM, Tracer, M856 (Inspection)					NEXT HIGHER ASSEMBLY  Not applicable  PARAGRAPH REFERENCE / INSPECTION METHOD
<b>CATEGORY</b>						
105.	Case mouth not crimped in cannellure (11)				3.1	Visual
106.	No evidence of mouth anneal (21)				3.1	Visual
107.	Draw scratch (8)				3.1	Visual
108.	Split bullet jacket (24)				3.1	Visual
109.	Loose bullet (25)				3.1	Visual
110.	Loose primer (35)				3.1	Visual
111.	Scaly metal (12)				3.1	Visual
112.	Profile and alignment				3.1	Gage
113.	Diameter of head				3.1	Gage
114.	Thickness of head				3.1	Gage
115.	Length to shoulder datum diameter				3.1	Gage
116.	Depth of primer				3.1	Gage
117.	Diameter of extractor groove, max				3.1	Gage
118.	Nato mark missing				3.1	Visual
119.	Dent (5)				3.1	Visual
<b>NOTES:</b>	Numbers after defect descriptions refer to visual defect standards in MIL-STD-636 (NATO Caliber 7.62MM Section).					

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**CLASSIFICATION OF DEFECTS & TESTS**

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PARAGRAPH	TITLE	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	SHEET 3 OF 4		DRAWING NUMBER 9342865	NEXT HIGHER ASSEMBLY Not applicable
				AQL OR 100%	REQUIREMENT PARAGRAPH		
CATEGORY	EXAMINATION OR TEST			NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
4.5.6.4	Cartridge, 5.56MM, Tracer, M856 (Inspection)						
<u>Minor:</u>	(Group AQL-1.50%)						
201.	Discolored, dirty, oily, or smeared (1)				3.1	Visual	
202.	Case dented (5)				3.1	Visual	
203.	Scaly metal on case (12)				3.1	Visual	
204.	Fold, wrinkle, buckle or bulge in case (14, 15, 16, 17)				3.1	Visual	
205.	Head stamp missing or illegible (18)				3.1	Visual	
206.	Defective head (19)				3.1	Visual	
207.	Defective mouth (20)				3.1	Visual	
208.	Bullet dented (22)				3.1	Visual	
209.	Bullet scratched (23)				3.1	Visual	
210.	Scaly metal on bullet (27)				3.1	Visual	
211.	Upset (Crooked) point (28)				3.1	Visual	
212.	Blunt point (30)				3.1	Visual	
213.	Defective cannelure (31)				3.1	Visual	
214.	Nicked or dented primer (36)				3.1	Visual	
215.	No waterproofing material (primer pocket joint) (37)				3.1	Visual	
216.	Defective crimp (28)				3.1	Visual	
217.	Scratch (case) (9)				3.1	Visual	
218.	More than 50% missing or improper color of bullet tip				3.1	Visual	
219.	Extractor groove diameter undersize				3.1	Gage	
220.	Draw Scratch (8)				3.1	Visual	
<b>Notes:</b>	Numbers after defect descriptions refer to visual defect standards in MIL-STD-636 (NATO Caliber 7.62MM Section).						

AMSMC Form 1570, 1 Feb 85

Replaces DRSiC-QA (D) Form 160, 1 Aug 83, which may not be used.



QUALITY CONFORMANCE TESTING

CLASSIFICATION OF DEFECTS & TESTS

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PARAGRAPH	TITLE	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AGL OR 100%	SHEET	4 OF 4	DRAWING NUMBER	
							PARAGRAPH REFERENCE	INSPECTION METHOD
4.5.6.4	Cartridge, 5.56mm, Tracer, M856 (Testing)							NEXT HIGHEN ASSEMBLY
CATEGORY						REQUIREMENT PARAGRAPH		
	Bullet extraction		25 75	0-3 2-3		3.3	4.6	
	Airtightness of base closure seal <u>1/</u>		25 75	3-7 7-8		3.16	4.6	
	Waterproofness		50 150	3-10 9-10		3.5	4.6	
	Residual stress		50 150	0-2 1-2		3.4	4.6	
	Hardness (head)		10	0-1		3.1	4.6	
	Hardness (sidewall)		10 30	0-2 1-2		3.1	4.6	
	BALLISTICS TESTS (see Table III)						4.6	
	Certificate of Conformance						4.5.8	
NOTE:	<u>1/</u> 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 II. Firing defects are specified in Table III. Tests shall be conducted as specified in paragraph 4.3.

4.5.7.1 Ballistic test samples. The quantities for the various ballistic tests are as specified in Table II. Only cartridges that have been previously submitted to and passed the requirements of the critical inspections specified in para 4.5.6.4 shall be used for the ballistic tests. To assure a random sample for each test the sample cartridges from the lot shall be combined and intermixed prior to being divided into samples for the various test.

TABLE II  
Ballistic test samples  
temperatures

<u>TEST</u>	<u>Ambient</u>	<u>70 +2</u>	<u>-65 +5</u>	<u>+125 +2</u>	<u>Requirement Paragraph</u>
Action Time <u>1/</u>		20	20	20	3.10&3.15
Velocity <u>1/</u>		20	20	20	3.6&3.10
Chamber press <u>1/</u>		20	20	20	3.7&3.10
Port press <u>1/</u>		20	20	20	3.8&3.10
M249 Function & Casualty <u>2/,3/</u>	400		200	200	3.12
M16A2 Function & Casualty <u>2/,3/</u>	400		200	200	3.12
Accuracy at 600 yards <u>8/</u>	90				3.11
Matching <u>7/</u>	30				3.11
Fouling <u>4/</u>	800		400	400	3.13
Trace <u>6/</u>	400				3.9
Bullet Integrity <u>5/</u>	200				3.14

Note 1/ Failure of the cartridges 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 simultaneously with velocity.

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Note 2/ See Table III for defect classification and accept - reject criteria. The individual results of the M249 machine gun and M16A2 rifle shall be compared to Table III for the specified defects stated.

Note 3/ Function and casualty testing shall be conducted with both the M249 machine guns and the M16A2 rifle. The M249 shall utilize 200 round magazines; the M16A2 shall utilize 20 round magazines.

Note 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.

Note 5/ 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 than four 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.

Note 6/ 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 it observation point shall not be scored as defects.

Note 7/ One of the 30-round targets from the Accuracy test shall be used on the sample for this test.

Note 8/ The ninety round sample for this test shall be three thirty-round targets. One round is permitted to miss only one of the targets. Two or more misses out of all valid targets shall result in rejection of the lot. See SCATP-5.56mm (Heavy Bullet) for definition of "valid target". If the three 30-round targets do not meet the requirement, their results shall be excluded and an additional six 30-round targets shall be fired and checked for compliance with the requirement.

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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 III.

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.

4.5.7.3 Accept - reject criteria for function and casualty

tests. The lot shall be rejected when function and casualty defects (at all temperatures combined) plus the firing defects observed in all other ballistic tests exceed the first sample number listed in Table III. The lot is then eligible for a retest provided that the defects observed do not equal or exceed reject number in Table III. If this reject number is exceeded the lot is automatically rejected with no provisions for retesting.

Therefore, if the number of defects found in the above tests exceeds the acceptance number for the first sample, but is less than the reject number for the first sample, a second sample, consisting of double the quantities specified under function and casualty test, shall be fired in both the M249 and M16A2 weapons. This procedure shall apply regardless of the weapon or weapons in which the firing defects occurred in the first test. If any firing tests for either weapon exceed the cumulative acceptance number, the lot shall be rejected. If, in testing a second sample, defects other than those for which the second sample is being tested should occur to the extent that they exceed the acceptance number for the cumulative sample, the lot shall be rejected.

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TABLE III

Function and casualty defect classification and accept/reject criteria for individual M249 and M16A2 test results (all temperatures combined)

<u>DEFECT</u>	<u>FIRST SAMPLE ACCEPT / REJECT</u>		<u>CUMULATIVE ACCEPTANCE NO.</u>
1. Mistire <u>1</u> /			
a. No vent hole, or obstruction in the vent area <u>2</u> /	0	1	-
b. Other	1	3	2
2. Bullet remaining in bore <u>2</u> /	0	1	-
3. Primer leaks:			
a. Performance of firing pin indent in primer cup			
(1) M249 Machine gun	0	See <u>3</u> /	1
(2) M16A2 Rifle	0	See <u>3</u> /	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. <u>2</u> /	0	1	-
e. Dropped primer - Primer falls out of pocket upon retraction of bolt.	0	2	1

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f. Loose primer - Primer remains in pocket but is physically loose	0	2	2
4. Case casualties			
a. Logitudinal split <u>4</u> /			
(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 <u>4</u> /			
(1) Partial, shoulder or body (J and S)	1	3	2
(2) Partial, body (K) <u>2</u> /	0	1	-
(3) Partial, head (L) <u>2</u> /	0	1	-
(4) Complete <u>2</u> /	0	1	-
5. Failure to extract	0	2	1
6. Weapon stoppage <u>5</u> /	0	2	1

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.

3/ If one or more defects are found in the first sample, a second sample shall be fired. The second sample shall consist of double the quantity of cartridges specified under function and casualty of Table II for such weapon(s). If an additional primer perforation is found in the second sample, the lot shall be rejected.

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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 Certificates of conformance. Certificates of conformance are required for the Tracer Composition R-528 (dwg. 9342867) and the Igniter I-194 (dwg. 10522419). Failure of these pyrotechnics to meet the requirements specified on the applicable drawings shall result in rejection of the component lot (batches). Only pyrotechnic lots having certificates of conformance are to be used in production.

4.5.9 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 cartridge type conforms to the drawing. Occurrence of a high pressure test, dummy or blank cartridge shall be classed as a critical defect. Occurrence of any type other than those listed shall be classed as a major defect. All nonconforming cartridges shall be rejected. Inspection for packaging, packing and marking shall be in accordance with MIL-STD-644 as applicable to the drawing.

4.5.10 Inspection equipment. The examinations and tests shall be made using the equipment prescribed in Equipment Lists on LI-9342865. Unless otherwise specified, acquisition, maintenance and disposition of inspection equipment shall be in accordance with MIL-I-45607.

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
- Matching
- Trace

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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 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, B and C (worldwide shipment). The cartridges shall be packed in accordance with drawing 9345240-2 and 9354586.

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

## 6. NOTES

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

6.2 Ordering data. See MIL-A-48078.

6.3 Submission of inspection equipment for design approvals. See MIL-A-48078. Submit designs as required to Commander, ARDEC, ATTN: AMSMC-QAF-I(D), Dover, NJ 07801-5001.

6.4 Hazard notice. The cartridge described herein and some of its components are flammable and explosive and consequently present hazards in manufacture, handling, storage and shipment. The contractor should recognize these hazards and take appropriate measures to prevent fire, explosion, adverse environment, rough handling, corrosive atmosphere, and electrically inducted 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 US Army Armament Research, Development and Engineering Center may also include drawings prepared by, and identified as Edgewood Arsenal, Frankford Arsenal, Rock Island Arsenal, US Army Armament Research and Development Command (ARRADCOM) and Picatinny Arsenal drawings. Technical data originally prepared by these activities is now under the cognizance of ARDEC.

6.6 Changes from previous issues. The margins of this specification are marked with vertical lines to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the previous issue.

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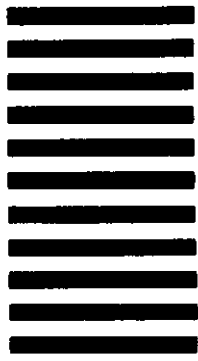
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## STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER MTI-C-63990B		2. DOCUMENT TITLE CARTRIDGE, 5.56MM TRACER, M856	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one) <input type="checkbox"/> VENDOR <input type="checkbox"/> USER <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> OTHER (Specify): _____	
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5. PROBLEM AREAS			
a. Paragraph Number and Wording:			
b. Recommended Wording:			
c. Reason/Rationale for Recommendation:			
6. REMARKS			
7a. NAME OF SUBMITTER (Last, First, MI) - Optional		b. WORK TELEPHONE NUMBER (Include Area Code) - Optional	
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