

INCH-POUNDMIL-C-70724(AR)
22 October 1992

MILITARY SPECIFICATION
CARTRIDGE, 5.56MM, BLANK, M200A1
PERFORMANCE SPECIFICATION FOR

This specification is approved for use by the U.S. 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 requirements, examinations, and tests necessary to procure any design of Cartridge, 5.56mm, Blank, M200a1 (SEE 6.1).

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards and handbooks. The following specifications, standards and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents shall be 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).

SPECIFICATIONS

FEDERAL

O-I-503	-Insect Repellant, Clothing and Personal Application
O-T-620	-1,1,1 Trichloroethane, Technical Inhibited (Methyl Chloroform)
PPP-B-636	-Boxes, Shipping, Fiberboard
P-D-680	-Dry Cleaning Solvent

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 self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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MILITARY

MIL-P-116	-Preservation, Methods of
MIL-C-372	-Cleaning Compound Solvent (for Bore of Small Arms and Automatic Aircraft Weapons)
MIL-L-2104	-Lubricating Oil, Internal Combustion Engine, Tactical Service
MIL-L-3150	-Lubricating Oil, Preservative, Medium
MIL-L-14107	-Lubricating Oil, Weapons, Low Temperature
MIL-L-46000	-Lubricant, Semi-Fluid (Automatic Weapons)
MIL-L-46167	-Lubricating Oil, Internal Combustion Engine, Arctic
MIL-A-48078	-Ammunition, Standard Quality Assurance Provisions, General Specification for
MIL-L-63460	-Lubricant, Cleaner and Preservative for Weapons and Weapon Systems

STANDARDS

MILITARY

DOD-STD-100	-Engineering Drawing Practices
MIL-STD-109	-Quality Assurance Terms and Definitions
MIL-STD-129	-Marking for Shipping and Storage
DOD-STD-480	-Configuration Control, Engineering Changes, Deviations and Waivers
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 Packaging, Packing and Marking of Small Arms Ammunition
MIL-STD-650	-Explosives: Sampling, Inspection and Testing
MIL-STD-810	-Environmental Test Methods and Engineering Guidelines
MIL-STD-1168	-Ammunition Lot Numbering

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the 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.

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DRAWINGS

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

7643674	-Classification of Cartridge Case Defects, Small Arms Ammunition.
8837375	-ARRADCOM Environmental Testing Criteria for OCONUS Shipping Containers
9357903	-SAW, M249, Blank, Ammo Magazine Assembly
9357936	-Magazine Ammunition, 5.56mm Loaded, M200 Blanks
10520006	- Ball, 3.94 oz.
10524139	-Pin Firing, 5.56mm
10542291	-Packing and Marking; Cartridges (Grenade and Blank) 5.56mm; Cartons; Box, Ammunition, M2A1; Box; Wirebound
11691287	-Link, Cartridge, Metallic Belt, 5.56mm, M27
12590316	-Blank Cartridges, 5.56mm; Mag; Bandoleers; Box, Ammunition, PA108; Box, Wirebound
12598560	-Cartridge, 5.56mm, Blank, M200A1
19-48-4168	-Unitization Procedures for Commercial Ammunition and Components

PUBLICATIONS

DEPARTMENT OF DEFENSE

SCATP - 5.56mm-2	5.56mm-Small Caliber Ammunition Test procedures for 5.56mm Ammunition
TB 700-2	-Department of Defense Explosives Hazard Classification Procedures
JSSPM	-Joint Services Safety and Performance Manual for Qualifications of Explosives for Military Use.

DEPARTMENT OF TRANSPORTATION

Code of Federal Regulations Title 49	United Nations-Transport of Dangerous Goods
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TEST OPERATIONS PROCEDURES (TOPs)

U.S. Army Test and Evaluation Command (TECOM)

TOP 3-2-045	-Automatic Weapons, Machine Guns, Hand and Shoulder weapons
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(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 documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

American National Standards Institute

ANSI - Y14.5-82 -Dimensioning and Tolerancing

(Application for copies should be addressed to ANSI, 1430 Broadway, New York, N.Y. 10018)

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 been obtained.

3. REQUIREMENTS

3.1 General. The cartridge shall comply with the requirements specified on drawing 12598560, referenced specifications and the requirements stated in this section. All of the cartridge components shall be compatible with each other. The primer mix shall be non-corrosive and the propellant shall be smokeless. The cartridge shall be compatible with the 5.56mm M27 link, 5.56mm 10-round stripper clip, the 5.56mm 20 and 30 round magazines the SAW ammunition container as well as the bolts, chambers, barrel bores and gas and feed systems of the weapons specified in 3.4.5. The cartridge shall present no operational problems in the field.

3.2 Qualification. When specified in the solicitation, contract or purchase order, a sample shall be submitted for qualification in accordance with the technical provisions specified herein (see section 4.3). The purpose of qualification is to verify that a particular contractor's design is capable of meeting the requirements of this specification. Such qualification does not, in any way, relieve the contractor of his contractual obligation to deliver items meeting all requirements

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specified herein. Upon qualification, the contractor's design shall be considered qualified indefinitely. The contractor shall submit level 3 detailed item drawings in accordance with DOD-STD-100 and ANSI Y14.5-82 to the Government for configuration control. The drawings submitted may utilize the contractors format and need not be on Government milars with Government numbers. All changes shall be submitted in accordance with DOD-STD-480 for review and approval by the Government. The Government reserves the right to subject the revised design to any or all of the qualification evaluations at the expense of the contractor.

3.3 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 specified herein (see 4.4).

3.4 Performance characteristics.

3.4.1 Primer sensitivity. The average height (h) and standard deviations (s) of the height of fire shall be such that $h + 3s \leq 13$ inches and $h - 3s \geq 2.5$ inches.

3.4.2 Residual stress. The cartridge shall not split when subjected to the accelerated stress tests for the applicable materials.

3.4.3 Waterproof. The cartridge shall not release more than one bubble of air when subjected to a pressure of 2 pounds per square inch (psi) below atmospheric and held at that pressure for 15 seconds.

3.4.4 Chemical compatibility. The cartridge shall be safe to store and fire (no critical defects in accordance with Table IV) when subjected to the lubricants and solvents listed below. The reliability shall not degrade by more than 0.10 (see 6.8) after exposure to the following substances.

<u>Material</u>	<u>Specification</u>
Bore Cleaner (RBC)	MIL-C-372
Insect Repellent	0-1-503
Trichloroethane Solvent	0-T-620
Dry-cleaning Solvent (SD-1)	P-D-680
Lubricating Oil (ICE, T)	MIL-L-2104
Lubricating Oil, Preservative, Medium	MIL-L-3150
Lubricating Oil (LAW)	MIL-L-14107
Lubricating Oil (LSA)	MIL-L-46000
Lubricating Oil (ICE, A)	MIL-L-46167
Lubricant (CLP)	MIL-L-63460

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3.4.5 Function and casualty. The cartridge shall function without casualty within the temperature range of -25°F through +125° in the weapons equipped with the indicated blank firing attachments specified below. The cartridge shall function safely (no critical defects in accordance with Table IV) within the temperature range of -65°F through +155°F.

<u>Weapon</u>	<u>BFA</u>	<u>Cyclic Rate</u>	
		<u>Min</u>	<u>Max</u>
M16A1 Rifle	M15A2	550	920
M16A2 Rifle	M15A2	550	920
M231 Sub-Machine Gun	M22		
M249 Machine Gun	M15A2	650	950

3.4.5.1 Cyclic rate. The cartridge shall operate the weapons within the rate limits specified in 3.4.5, within the temperature range of -25°F through +125°F.

3.4.5.2 Noise level. The noise level of the blank cartridges shall be greater than 100 decibels when the noise level of ball-cartridges fired under identical conditioner except for the use of the BFA, is between 120 and 130 decibels. The maximum noise level at the gunners ear position shall not exceed 164 decibels.

3.4.5.3 Screen perforation.

3.4.5.3.1 Screen perforation with BFA. The cartridge, when fired, shall not cause perforations of greater than 0.1 inch in diameter in a paper screen placed 15 feet from and oriented perpendicular to the direction of the BFA orifice.

3.4.5.3.2 Screen perforation without BFA. The cartridge, when fired without a BFA, shall not cause perforations of greater than 0.1 inch in diameter in a paper screen placed 15 feet from and perpendicular to the weapon muzzle.

3.4.5.4 Breech flash. When fired in the specified weapons, the cartridge shall not cause flash from the breech of the weapon which would endanger the shooter.

3.4.5.5 Fouling. The fouling produced by the cartridge shall be readily removable through standard cleaning techniques. The fouling produced by the firing of 500 cartridges shall not cause a change in cycle rate, from the first to the last burst, greater than 15%.

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3.4.5.6 Attitude. The cartridge shall be safe to fire (no critical defects in accordance with Table IV) and the reliability shall not degrade more than 0.10 (See 6.8) when fired at elevations between ± 85 degrees.

3.4.5.7 Cartridge ejection. The fired cartridge case shall not eject from the weapon such that it endangers the shooter, and no burning propellant shall be ejected in the area of the shooters.

3.4.5.8 Belt pull. The cartridge shall exhibit sufficient energy to operate the M249 machine gun when pulling the equivalent weight of a free hanging 200 round belt.

3.4.5.9 Hot chamber effects. Immediately following the continuous firing of the prescribed number of rounds (200 rounds in the machine guns and 150 rounds in the rifles and sub-machine guns) the cartridge shall not fire upon insertion into the weapon chamber. Following the prescribed waiting period, the weapon shall be readily clearable.

3.5 Environmental.

3.5.1 Sand and dust. The cartridge shall be safe to fire (no critical defects in accordance with Table IV) when subjected to sand and dust.

3.5.2 Corrosion. The cartridge shall be safe to store and fire (no critical defects in accordance with Table IV) after being subjected to a 5% salt spray.

3.5.3 Temperature/humidity cycling. The cartridge shall be safe to store and fire (no critical defects in accordance with Table IV) after being subjected to a 10-day temperature/humidity cycle. The reliability of the cartridge (see 6.8) shall not degrade by more than 0.05 and the cyclic rate shall not change by more than 15% after being subjected to temperature/humidity cycling.

3.5.4 Long term storage.

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3.5.4.1 Continuous heating. The cartridge shall be safe to store and fire (no critical defects in accordance with Table IV) when the cartridge is subjected to 120 days continuous heating at 120°F and 15% relative humidity. The reliability of the cartridge (see 6-8) shall not degrade by more than 0.05 and the cyclic rate shall not change by more than 15% after being subjected to continuous heating.

3.5.4.2 Continuous cooling. The cartridge shall be safe to store and fire (no critical defects in accordance with Table IV) when the cartridge is subjected to 30 days continuous cooling at -40° F. The reliability of the cartridge (see 6.8) shall not degrade by more than 0.05 and the cyclic rate shall not change by more than 15% after being subjected to continuous cooling.

3.5.5 Rough handling. The cartridge shall be safe to store and fire (no critical defects in accordance with Table IV) when the cartridge is subjected to rough handling. The reliability of the cartridge (see 6.8) shall not degrade by more than 0.05 and the cartridge shall remain waterproof after being subjected to rough handling.

3.6 Toxic fumes. The toxic fumes produced by the cartridge shall be acceptable to the Surgeon General for the applicable training scenarios and shall not exceed those produced by the firing of M193 ball cartridges.

3.7 Safety.

3.7.1 Safety hazard classification. The safety hazard classification for the cartridge packed for shipping and storage shall be:

DOD Hazard Class: 1.4
DOD Storage Compatibility Group: S
DOT Hazard Class: Class C Explosive
DOT Container Marking: Small Arms Ammunition

3.7.2 Net explosive weight. The net explosive weight of the cartridge (sum of propellant, primer and any other pyrotechnic material) shall not exceed 15 grains.

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3.7.3 Explosive sensitivity. Explosive sensitivity data for all energetic materials contained in the cartridge must be on file with the ARDEC Safety Office. The sensitivity of these materials shall be as follows:

<u>Sensitivity Test</u>	<u>Results Required</u>
a. Impact, ERL type 12 tools. 2.4 kg, cm 50% point	20 cm (min)
b. Friction Pendulum - Steel Shoe - Fiber Shoe	Burn - no detonation Burn - no detonation
c. Electrostatic Discharge 0.030 Joule	No detonation in 20 tests
d. Differential Thermal Analysis	200 C (min)

3.8 Workmanship. All plastic parts shall exhibit thorough workmanship. They shall be free of porosity, twist, warpage, heat marks, sinks, voids, cracks, chipped edges, burrs, bubbles, blisters, burn marks or other defects that would affect their serviceability. All metal parts shall exhibit thorough workmanship. They shall be free of burrs, chips, chipped edges, gouges, cracks, splits, surface defects, dust, dirt, grease, oil, lacquer smears, and other foreign matter. The cleaning methods used shall not be injurious to any part, nor shall the parts be contaminated by any cleaning agent. All assemblies shall exhibit thorough workmanship. Extreme care should be exercised to avoid contamination of primers or 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 (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 the specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

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4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspections 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 Classification of inspection. The inspection requirements specified herein are classified as follows:

- a. Qualification. (see 4.3)
- b. First article inspection. (see 4.4)
- c. Quality conformance inspection. (see 4.5)

4.3 Qualification.

4.3.1 Submission. The contractor shall submit a qualification sample of 130,000 cartridges, as designated by the contracting officer for evaluation in accordance with the provisions specified below.

4.3.2 Qualification sample. The qualification sample shall be of the same design as will be submitted for regular production. It shall be manufactured using the same materials and processes as will be used in normal production. Equipment utilized to manufacture the qualification sample shall embody the process techniques to be used in normal production. Qualification samples shall not be custom made in such a way that causes the product quality to be different than that which can be expected in normal production.

4.3.3 Inspections to be performed. See Table 1. Additional inspections and tests may be required by the contract.

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4.3.4 Examination for defects. Examination for major and minor defects shall be performed in accordance with Table I and 4.5.2. The sample to be examined for major and minor defects shall be drawn in such a way that it is representative of the entire quantity submitted. Non-conforming cartridges shall be rejected and put aside for further examination.

4.3.5 Rejection. The qualification sample shall be rejected if any one of the following occurs:

a. The qualification sample fails to conform with the applicable drawings and requirements of Tables I and IV.

b. The materials and process techniques utilized to manufacture the sample could not be applied in normal production.

c. The equipment utilized to manufacture the sample does not represent the equipment to be used in normal production.

4.3.6 Basis for qualification. Contractors that meet all of the qualification requirements will be placed on the qualified vendor's list. The vendor shall remain on the list as long as the same design and materials are used.

TABLE I. Qualification

CLASSIFICATION OF CHARACTERISTICS

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PARAGRAPH	TITLE	EXAMINATION OR TEST	CONFORMANCE CRITERIA	SHEET 1 OF 6	DRAWING NUMBER	
					12598560	NEXT HIGHER ASSEMBLY
CLASSIFICATION				REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE	
	Cartridge, 5.56MM, Blank, M200A1					
	Examination for defects	Major Class	Acc-Rej	3.1	4.3.4, 4.5.2	
		Minor Class	346 0 - 1			
	Primer sensitivity		103 0 - 1	3.4.1	4.7.1	
	Residual stress		500 1/	3.4.2	4.7.2	
	Waterproof		100 0 - 1			
			300 1 - 2	3.4.3	4.7.3	
			50 11 - 16			
			100 26 - 27	3.4.4	4.6.1, 4.7.4	
	Chemical Compatibility	M16A2	1/			
		M231				
		M249				
	M16A1 Function and casualty			3.4.5	4.6.2, 4.7.5	
		+700F	7500 Table IV			
		-250F	7500 Table IV			
		+1250F	7500 Table IV			
		-650F	500			
		+1550F	500			

NOTES: 1/ Check for compliance with the requirement.
 2/ Divided equally among 5 weapons.
 3/ Cartridges to be fired in one weapon noting only critical defects in accordance with Table IV.

TABLE I. Qualification

CLASSIFICATION OF CHARACTERISTICS

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PARAGRAPH	TITLE	SHEET 2 OF 6		DRAWING NUMBER	
		EXAMINATION OR TEST	CONFORMANCE CRITERIA		REQUIREMENT PARAGRAPH
	Cartridge, 5.56MM, Blank, M200A1			12598560	
				NEXT HIGHER ASSEMBLY	
CLASSIFICATION					
	M16A2 Function and casualty +700F -250F +1250F -650F +1550F	2/ 2/ 2/ 3/ 3/	7500 Table IV 7500 Table IV 7500 Table IV 500 500	3.4.5	4.6.2, 4.7.5
	M231 Function and casualty +700F -250F +1250F -650F +1550F	2/ 2/ 2/ 3/ 3/	7500 Table IV 7500 Table IV 7500 Table IV 500 500	3.4.5	4.6.2, 4.7.5
	M249 Function and casualty +700F -250F +1250F -650F +1550F	2/ 2/ 2/ 3/ 3/	7500 Table IV 7500 Table IV 7500 Table IV 500 500	3.4.5	4.6.2, 4.7.5
	Cyclic Rate		4/	3.4.5.1	4.6.3
<p>NOTES: 1/ Check for compliance with the requirement. 2/ Divided equally among 5 weapons. 3/ Cartridges to be fired in one weapon noting only critical defects in accordance with Table IV. 4/ Conducted simultaneously with function and casualty.</p>					

Replaces AMSMC Form 1570a, 1 Apr 85, which may not be used.

TABLE I. Qualification

CLASSIFICATION OF CHARACTERISTICS

MIL-C-70724 (AR)

PARAGRAPH	TITLE	SHEET 3 OF 6		DRAWING NUMBER
		CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	
	Cartridge, 5.56MM, Blank, M200 A1			NEXT HIGHER ASSEMBLY
CLASSIFICATION	EXAMINATION OR TEST			
	Noise level (M16A2 only) Screen perforation with BFA Screen perforation without BFA M16A1	60 4/	1/ 1/	3.4.5.2 3.4.5.3 3.4.5.3 4.7.6 4.7.5 4.7.7
	M16A2	30 30 30	1/ 1/ 1/	
	M231	30 30 30	1/ 1/ 1/	
	M249	30 30 30	1/ 1/ 1/	
		50 50 50	1/ 1/ 1/	
NOTES:	1/ Check for compliance with the requirement. 4/ Conducted simultaneously with function and casualty.			

TABLE I. Qualification

CLASSIFICATION OF CHARACTERISTICS

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PARAGRAPH	TITLE	SHEET 4 OF 6		DRAWING NUMBER
	Cartridge, 5.56MM, Blank, M200 A1			12598560
				NEXT HIGHER ASSEMBLY
CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
	Breech flash	4/	3.4.5.4	
	Fouling	4/	3.4.5.5	4.6.4, 4.7.5
	Attitude		3.4.5.6	4.7.8
	M16A1	1/		
	M16A2	1/		
	M231	1/		
	M249	1/		
	Cartridge ejection	4/	3.4.5.7	4.6.5
	Belt Pull (M249 only)	1/	3.4.5.8	4.7.9
	Hot chamber effects		3.4.5.9	4.6.6, 4.7.10
	M16A1	5/		
	M231	5/		
	M249	5/		
	sand and dust		3.5.1	4.7.11
	M16A1	1/		
	M16A2	1/		
	M231	1/		
	M249	1/		

NOTES: 1/ Check for compliance with the requirement.
 4/ Conducted simultaneously with function and casualty.
 5/ Conducted twice with half the sample for each trial.

TABLE I. Qualification

CLASSIFICATION OF CHARACTERISTICS MIL-C-70724 (AR)

PARAGRAPH	TITLE	SHEET 5 OF 6		DRAWING NUMBER
		CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	
	Cartridge, 5.56MM, Blank, M200A1			12598560 NEXT HIGHER ASSEMBLY
CLASSIFICATION	EXAMINATION OR TEST			
	Corrosion M16A1 M16A2 M231 M249	100 1/1 1/1 1/1	3.5.2	4.7.12
	Temperature/humidity cycling M16A1 M16A2 M231 M249	1000 1/1 1/1 1/1	3.5.3	4.7.13
	Continuous heating M16A1 M16A2 M231 M249	1000 1/1 1/1 1/1	3.5.4	4.7.14
	Continuous cooling M16A1 M16A2 M231 M249	1000 1/1 1/1 1/1	3.5.4	4.7.15
NOTES:	1/ Check for compliance with the requirement.			

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

TABLE I. Qualification

CLASSIFICATION OF CHARACTERISTICS

MIL-C-70724 (AR)

PARAGRAPH	TITLE	SHEET 6 OF 6		DRAWING NUMBER
		CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	
	Cartridge, 5.56MM, Blank, M200A1			12598560 NEXT HIGHER ASSEMBLY
CLASSIFICATION	EXAMINATION OR TEST			
	Rough handling M16A1 M16A2 M231 M249 Waterproof	1000 1000 1000 1000 150 26 - 27	3.5.5	4.7.16
	Toxic fumes M16A1 M16A2 M231 M249	150 150 150 150	3.6	4.7.3 4.7.17
	Safety hazard classification Explosive Sensitivity	6/ 7/	3.7 3.7	4.7.18 4.7.19
<p>NOTES: 1/ Check for compliance with the requirement. 6/ To be conducted by the contractor after all other requirements for qualification have been met. This will require approximately 10,000 rounds packed in accordance with Section 5, Packing. 7/ Test as required by the ARDEC Safety Office.</p>				

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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 4.4.2. The first article sample shall consist of the assemblies? components and test specimens listed below in the quantities indicated.

<u>Nomenclature</u>	<u>Drawing</u>	<u>Quantity</u>
Cartridge 5.56mm, Blank, M200A1	12598560	30,000

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 this detail specification and be inspected for compliance with 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 II. First article inspection

CLASSIFICATION OF CHARACTERISTICS

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PARAGRAPH	TITLE	SHEET 1 OF 3		DRAWING NUMBER
	Cartridge, 5.56MM, Blank, M200A1			12598560
				NEXT HIGHER ASSEMBLY
CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
	Examination for defects	<u>Acc-Rej</u>	3.1	4.4.2, 4.5.2
	Major Class	346 0 - 1		
	Minor Class	103 0 - 1		
	Primer sensitivity	500 1/	3.4.1	4.7.1
	Residual stress	100 0 - 1	3.4.2	4.7.2
	Waterproof	300 1 - 2		
		50 11 - 16	3.4.3	4.7.3
	Chemical Compatibility	100 26 - 27		
	M16A2	1/	3.4.4	4.6.1, 4.7.4
	M231			
	M249			
	M16A1 Function and casualty		3.4.5	4.7.5
	+700F	1500 Table IV		
	-250F	1500 Table IV		
	+1250F	1500 Table IV		
	M16A2 Function and casualty		3.4.5	4.7.5
	+700F	1500 Table IV		
	-250F	1500 Table IV		
	+1250F	1500 Table IV		

NOTES:

- 1/ Check for compliance with the requirement.
- 2/ Divided equally among 3 weapons.

TABLE II. First article inspections.

CLASSIFICATION OF CHARACTERISTICS

MIL-C-70724 (AR)

PARAGRAPH	TITLE	SHEET 2 OF 3		DRAWING NUMBER
	Cartridge, 5.56MM, Blank, M200A1			12598560
				NEXT HIGHER ASSEMBLY
CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
	M231 Function and casualty +700F -250F +1250F	1500 Table IV 1500 Table IV 1500 Table IV	3.4.5	4.7.5
	M249 Function and casualty +700F -250F +1250F	1500 Table IV 1500 Table IV 1500 Table IV	3.4.5	4.7.5
	Cyclic Rate Noise level (M16A2 only) Screen perforation with BFA Screen perforation without BFA M16A1	3/ 1/ 4/ 30 30 30	3.4.5.1 3.4.5.2 3.4.5.3 3.4.5.3	4.6.3 4.7.6 4.7.5 4.7.7
	M16A2 +700F -250F +1250F	1/ 1/ 1/		
	+700F -250F +1250F	30 30 30		

NOTES:
 1/ Check for compliance with the requirement.
 2/ Divided equally among 3 weapons.
 3/ Conducted simultaneously with function and casualty.

TABLE II. First article inspections.

CLASSIFICATION OF CHARACTERISTICS

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PARAGRAPH	TITLE	CARTRIDGE, 5.56MM, Blank, M200A1	SHEET 3 OF 3	DRAWING NUMBER
				12598560
				NEXT HIGHER ASSEMBLY
CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
	Screen perforation without BFA (Cont)		3.4.5.3	4.7.7
	M231	30	1/ 1/ 1/	
	+70°F	30	1/	
	-25°F	30	1/	
	+125°F			
	M249	50	1/	
	+70°F	50	1/	
	-25°F	50	1/	
	+125°F			
	Breech flash	3/	Table IV	
	Fouling	3/	3.4.5.4	
	Cartridge ejection	3/	3.4.5.5	4.6.4
	Belt Pull (M249 only)	3/	3.4.5.7	4.6.5
	Hot chamber effects	200	3.4.5.8	4.7.9
	M16A1		3.4.5.9	4.6.6, 4.7.10
	M231	151		
	M249	151		
	Corrosion	201	3.5.2	4.7.12
	M16A1	100		
	M16A2	100		
	M231	100		
	M249	100		

NOTES: 1/ Check for compliance with the requirement.
 3/ Conducted simultaneously with function and casualty.

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4.5 Quality conformance inspection.

4.5.1 Inspection lot formation. Inspection lot formation shall be in accordance with MIL-A-48078.

4.5.1.1 Lot submission. Unless otherwise specified, lots shall be homogeneous and of a size convenient to the contractor. The cartridge lot shall contain:

- a. Cartridge cases from one unchanged process and one manufacturer.
- b. primers from not more than 2 lots and one manufacturer.
- c. propellant from not more than 2 lots and one manufacturer.

4.5.1.2 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.

4.5.2 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 III below, using the inspection levels stated in the Classification of Characteristics paragraphs.

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TABLE III. Attributes sampling inspection

<u>Lot Size</u>	<u>Inspection Levels</u>	
	<u>III</u>	<u>v</u>
2 to 8	*	5
9 to 15	*	5
16 to 25	*	5
26 to 50	32	5
51 to 90	32	13
91 to 150	32	13
151 to 280	32	20
281 to 500	32	20
501 to 1200	80	20
1201 to 3200	80	32
3201 to 10000	125	32
10001 to 35000	125	50
35001 to 150000	125	50
150000 to 500000	200	50
500001 and over	200	50

Numbers under inspection levels indicate sample size; asterisks (*) indicate one hundred percent inspection. If sample size exceeds lot size, perform one hundred percent inspection. 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 assurance provision(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.

4.5.3 Rejection. Failure of the lot to be in accordance with the applicable drawings and requirements of 4.5.2 shall result in rejection of the lot.

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4.5.4 Function and casualty retests. The lot shall be rejected when function and casualty defects plus firing defects observed in all other firing tests exceed the acceptance criteria of Table IV. A second sample, consisting of double the quantities specified under the function and casualty test, shall be fired. If the total number of defects in the combined first and second samples exceeds the acceptance criteria of Table IV, the lot shall be rejected. If, in testing a second sample, defects other than those for which the second sample is being re-tested should occur to the extent that they exceed the acceptance criteria, the lot shall be rejected.

QUALITY CONFORMANCE INSPECTIONS

CLASSIFICATION OF CHARACTERISTICS

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PARAGRAPH	TITLE	SHEET 1 OF 3		DRAWING NUMBER	INSPECTION METHOD REFERENCE
4.5.2.1	Cartridge, 5.56MM, Blank, M200A1			12598560	NEXT HIGHER ASSEMBLY
CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH		
<u>CRITICAL</u>	<u>Examination for defects</u>		3.1		
	None defined				
	Cartridge profile failure (requiring more than 10 pounds dead weight to insert in profile and alignment gage)	LEVEL III	3.1	SMTE	
	Diameter of extractor groove, max	LEVEL III	3.1	SMTE	
	Diameter of head	LEVEL III	3.1	SMTE	
	Length of shoulder datum	LEVEL III	3.1	SMTE	
	Depth of primer	LEVEL III	3.1	Visual	
	Round head (4)	LEVEL III	3.1	Visual	
	Split (6) 2/	LEVEL III	3.1	Visual	
	Perforation (7)	LEVEL III	3.1	Visual	
	Beveled underside of head (10)	LEVEL III	3.1	Visual	
	Primer missing (32)	LEVEL III	3.1	Visual	
	Primer cocked (33)	LEVEL III	3.1	Visual	
	Primer inverted	LEVEL III	3.1	Visual	
	Primer loose (35)	LEVEL III	3.1	Visual	

NOTES: 1/ Numbers after defect descriptions refer to visual defect standards in MIL-STD-636 (NATO Caliber 7.62mm Section). 2/ A split shall be classed as a major defect regardless of location or occurrence of loss of propellant. 3/ Any other defect that is not critical but is likely to result in failure or to reduce materially the usability of the round for its intended purpose.

QUALITY CONFORMANCE INSPECTIONS

CLASSIFICATION OF CHARACTERISTICS

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PARAGRAPH	TITLE	SHEET 2 OF 3	DRAWING NUMBER	INSPECTION METHOD REFERENCE
4.5.2.1	Cartridge, 5.56MM, Blank, M200A1		12598560 NEXT HIGHER ASSEMBLY	
CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
114	Identification knurl missing Mouth waterproofing missing Mouth crimp missing or incorrect Cartridge Identification markings Missing/Incorrect Other <u>3/</u>	LEVEL III	3.1	Visual
115		LEVEL III	3.1	Visual
116		LEVEL III	3.1	Visual
117		LEVEL III	3.1	Visual
118		LEVEL III	3.8	Visual
<u>MINOR</u>				
201	Total length	LEVEL V	3.1	SMTE
202	Diameter of extractor groove, min	LEVEL V	3.1	SMTE
203	Diameter of head, min	LEVEL V	3.1	SMTE
204	Thickness of head	LEVEL V	3.1	SMTE
205	Discolored, dirty, oily, smeared (1)	LEVEL V	3.1	Visual
206	Corroded or stained, if etched (2)	LEVEL V	3.1	Visual
207	Dent (5)	LEVEL V	3.1	Visual
208	Draw scratch (8)	LEVEL V	3.1	Visual
209	Scaly metal (12)	LEVEL V	3.1	Visual

NOTES: 3/ Any other defect that is not critical but is likely to result in failure or to reduce materially the usability of the round for its intended purpose.

QUALITY CONFORMANCE INSPECTIONS

CLASSIFICATION OF CHARACTERISTICS

MIL-C-70724 (AR)

PARAGRAPH	TITLE	SHEET 3 OF 3	DRAWING NUMBER 12598560
CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH
			INSPECTION METHOD REFERENCE
4.5.2.1	Cartridge, 5.56MM, Blank, M200A1		NEXT HIGHER ASSEMBLY
<u>MINDR</u>			
210	Chamfer on head (rim) missing (13)	LEVEL V	3.1
211	Fold (14)	LEVEL V	3.1
212	Illegible or missing head stamp (18)	LEVEL V	3.1
213	Defective head (19)	LEVEL V	3.1
214	Nicked or dented primer (36)	LEVEL V	3.1
215	Waterproofing material missing (37) (Primer pocket joint)	LEVEL V	3.1
216	Defective primer crimp (38)	LEVEL V	3.1
217	Heat Marks	LEVEL V	3.1
218	Mold voids	LEVEL V	3.1
219	Burn Marks	LEVEL V	3.1
220	Other 4/	LEVEL V	3.1
<p>NOTES: 4/ Any other defect that is not likely to reduce materially the usability of the round for its intended purpose, or is a departure from established standards having little bearing on the effective use or operation of the round.</p>			

QUALITY CONFORMANCE INSPECTIONS

CLASSIFICATION OF CHARACTERISTICS

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PARAGRAPH	TITLE	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	DRAWING NUMBER
4.5.2.2	Cartridge, 5.56MM, Blank, M200A1			SHEET 1 OF 2	12598560 NEXT HIGHER ASSEMBLY
CLASSIFICATION					INSPECTION METHOD REFERENCE
<u>CRITICAL:</u>	<u>Tests</u> None defined.		<u>Rej-Acc</u>		
<u>MAJOR:</u>					
101.	Primer sensitivity		500 1/	3.4.1	4.7.1
102.	Residual stress		50 0 - 2 300 1 - 2	3.4.2	4.7.2
103.	Waterproof		50 11 - 16 100 26 - 27	3.4.3	4.7.3
104.	M16A1 Function and Casualty +700F -250F +1250F	2/ 2/ 2/	1000 Table IV 500 Table IV 500 Table IV	3.4.5	4.7.5
105.	M16A2 Function and Casualty +700F -250F +1250F	2/ 2/ 2/	1000 Table IV 500 Table IV 500 Table IV	3.4.5	4.7.5
NOTES:	1/ Check for compliance with the requirement. 2/ Divided equally among 2 weapons.				

Quality Conformance Inspections

CLASSIFICATION OF CHARACTERISTICS

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PARAGRAPH	TITLE	SHEET 2 OF 2	DRAWING NUMBER 12598560 NEXT HIGHER ASSEMBLY	INSPECTION METHOD REFERENCE
CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	
4.5.2.2	Cartridge, 5.56MM, Blank, M200A1			
106.	M231 Function and Casualty +700F -250F +1250F	1000 Table IV 500 Table IV 500 Table IV	3.4.5	4.7.5
107.	M249 Function and Casualty +700F -250F +1250F	1000 Table IV 500 Table IV 500 Table IV	3.4.5	4.7.5
108.	Cyclic Rate	3/	3.4.5.1	4.6.3
109.	Screen perforation with BFA	3/	3.4.5.3	4.7.5
110.	Breech flash	3/	3.4.5.4	
111.	Fouling	3/	3.4.5.5	4.6.4
	MINOR: None defined.			
<p>NOTES:</p> <p>1/ Check for compliance with the requirement.</p> <p>2/ Divided equally among 2 weapons.</p> <p>3/ Conducted simultaneously with function and casualty.</p>				

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TABLE IV. Firing defects.

<u>Class</u>	<u>Criteria 1/</u>
Critical	None allowed
1. BFA blockage	
2. Complete or partial rupture (dwg. 7643674, locations S, J, K and L)	
3. Detached material (Upon firing)	
4. Burn through	
5. Slamfire <u>2/</u>	
6. Hazardous Breech Flash or Sparks <u>3/</u>	
7. Other critical defects <u>4/</u>	
	Total majors allowed per 1000 rounds = 2.5
101. Blown or dropped primer	
102. Split body or head (dwg. 7643674 locations J, K, L and M)	
103. Gas leak at body/head interface	
104. Misfire	
105. Uncontrolled Fire <u>5/</u>	
106. Breech Flash <u>6/</u>	
107. Other Major defects <u>7/</u>	
Minor (Group A)	Total minors allowed per 1000 rounds = 10
201. Split, shoulder (dwg. 7643674, and S)	
202. Gas leak through or around primer cup	
203. Detached material (upon extraction)	
204. Breech Sparks <u>8/</u>	
205. Other minor defects <u>9/</u>	
Minor (Group B)	Total allowed per 1000 rounds = 10
206. Stoppages (attributable to ammunition)	

Notes:

1/ This table shall be applied separately to the results of each weapon type at each temperature condition.

2/ A slamfire occurs when a round is unintentionally fired by manually closing the weapon bolt, without depressing the trigger of the weapon.

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3/ Any occurrence of breech flash that will cause hazardous or unsafe conditions for a shooter (either right or left-handed). Any occurrence of breech sparks which eject into the area of the shooter.

4/ Any other defect that is likely to result in hazardous or unsafe conditions.

5/ Uncontrolled fire occurs when the number of rounds fired exceeds the number of rounds expected to fire. For example, if in the single shot mode, one trigger pull results in the firing of more than one round.

6/ Any occurrence of flame in the breech area that is not critical.

7/ Any other defect that is not critical but is likely to result in failure or to reduce materially the usability of the round or weapon for its intended purpose.

8/ Any instance of breech sparks which do not eject into the area of the shooter.

9/ Any other defect that is not likely to reduce materially the usability of the round or weapon for its intended purpose or is departure from established standards having little bearing on the effective use or operation of the round.

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4.6 Miscellaneous acceptance criteria.

4.6.1 Chemical compatibility acceptance criteria. The criteria will be considered met if no critical defects are encountered and if the reliability (see 6.8) of the test cartridge does not degrade when compared to the control sample by more than the allowable amount for each individual weapon/chemical configuration.

4.6.2 Function and casualty acceptance criteria for qualification testing. In view of the expenses associated with firing function and casualty tests with both ammunition and weapons temperature conditioned, the following shall be employed:

a. The occurrence of any critical defect shall be cause for rejection.

b. Function and casualty qualification testing at -65°F and $+155^{\circ}\text{F}$ shall be conducted with both the ammunition and weapons conditioned and fired at the test temperature. The acceptance criteria of Table IV, for all defect classes, shall be applied to the results of this testing.

c. If acceptable performance in accordance with Table IV at -65°F and $+155^{\circ}\text{F}$ is achieved, the remainder of the function and casualty tests (-25°F , $+20^{\circ}\text{F}$ and $+125^{\circ}\text{F}$) may be conducted with only the ammunition being temperature conditioned. The results of these firings must meet all Table IV acceptance criteria.

d. Failure of the -65°F or $+155^{\circ}\text{F}$ firings to meet all Table IV criteria for major or minor defects does not cause rejection, however, requires firing a portion of the function and casualty testing at the less extreme temperatures (-25°F or $+155^{\circ}\text{F}$), with both weapon and ammunition conditioned and fired at the test temperature. This shall be accomplished as follows:

(1) Failure at -65°F will require firing 1000 rounds at -25°F with both the weapon and the ammunition conditioned at the test temperature.

(2) Failure at $+155^{\circ}\text{F}$ will require firing 1000 rounds at $+125^{\circ}\text{F}$ with both the weapon and the ammunition conditioned at the test temperature.

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(3) The 1000 rounds shall be divided equally among 2 weapons of the type that failed testing at either -65°F or $+155^{\circ}\text{F}$. All firings must meet all acceptance criteria of Table IV.

(4) If the 1000 rounds fired above pass all the Table IV criteria, the remainder of the Function and Casualty testing with that weapon, at that temperature (6500 rounds) may be conducted with only the ammunition being temperature conditioned.

4.6.3 Cyclic rate acceptance criteria. To determine compliance with the cyclic rate requirements, cyclic rate values shall be averaged together as follows:

a. Starting average - All pairs of cyclic rate values taken at the start of all 500-round segments, from the same weapon type, at the same temperature, shall be averaged together.

b. Ending average - All pairs of cyclic rate values taken at the end of all 500-round segments, from the same weapon type, at the same temperature, shall be averaged together.

c. Overall average - The average of all cyclic rate values recorded throughout the 500-round segments, as indicated on the firing schedule for each weapon type at each temperature condition.

d. The starting, ending, and overall averages must meet the requirement for cyclic rate as specified for that weapon type.

4.6.4 Fouling acceptance criteria. To evaluate the effect of fouling on cyclic rate, the "ending average" cyclic rate shall be compared to the "starting average" cyclic rate for each weapon (see cyclic rate procedure). The difference shall be checked for compliance with the requirement.

4.6.5 Cartridge ejection acceptance criteria. The requirement shall be considered met if neither burning propellant nor fired cartridge cases are ejected from the weapon at an ejection angle less than 45 degrees.

4.6.6 Hot chamber effects acceptance criteria. If the cartridge cooks off or the case does not extract properly or if the weapon is not immediately serviceable because of some failure of the cartridge, then the cartridge is considered to have failed the test.

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4.7 Methods of inspection.

4.7.1 Primer sensitivity. The test shall be conducted in accordance with SCATP-5.56mm, Chapter 4, Section 1, utilizing the ball and firing pin identified on drawings 10520006 and 10524139. The complete rundown test shall be performed until such a time that the Government authorizes use of the 2 height test (with complete rundown tests performed at some specified interval).

4.7.2 Residual stress.

4.7.2.1 Cartridges with brass cases. Test in accordance with SCATP-5.56mm, Chapter 1, Section 8.

4.7.2.2 Cartridges with polyethylene cases. Test in accordance with Appendix A.

4.7.2.3 Cartridges with steel cases. Testing not required.

4.7.2.4 Cartridges with cases of other materials. Test in accordance with procedures approved by the Government appropriate to the material(s) used to manufacture the cartridge.

4.7.3 Waterproof. The test shall be conducted in accordance with SCATP 5.56mm, Chapter 1, Section 14.

4.7.4 Chemical compatibility. The test shall be conducted in accordance with Appendix B.

4.7.5 Function and casualty. Function and casualty and the following tests shall be conducted in accordance with Appendix C: cyclic rate, screen perforation with BFA, breech flash, fouling, and cartridge ejection. All firings in the M16A1 and M16A2 rifles shall be performed utilizing a "soft" mount which simulates shoulder firing conditions. Hard mounts shall be utilized for all M249 and M231 firings. All mount designs shall be submitted to the Government for approval. Except as otherwise specified, all firings in the M249 machine gun shall be conducted with the gas regulator set in the normal (rein gas) position, if the weapon has a selector.

NOTE: Temperature conditioning shall be as follows: 70°F ± 2° for not less than two hours; -25°F ± 2°F and 125°F ± 2°F for four to twelve hours.

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4.7.6 Noise level. Test in accordance with Appendix D. During the test an additional microphone shall be placed at the right-handed gunners head position and the noise level recorded. If the noise level recorded exceeds 135 decibels the test shall be repeated with the microphone at the left-handed gunners position.

4.7.7 Screen perforation without BFA. The test shall be conducted in the same way as screen perforation with BFA (see function and casualty test procedure, Appendix C) except that weapons be fired single-shot.

4.7.8 Attitude. The weapons shall be fired from a mount which allows the elevation to vary from -85 to +85 degrees. The test shall be conducted with one weapon of each type. All fired cases shall be inspected and all weapon stoppages noted. The quantity shall be fired in accordance with Table V. Rounds fired in the M249 shall be linked.

4.7.9 Belt pull. Firing shall be in bursts of approximately 10 rounds each, conducted from the M249 machine gun with the gas regulator set in the adverse condition (max. gas) position (if the weapon has a selector). A free hanging 200 round belt shall be pulled by each weapon. Any stoppages shall be recorded.

4.7.10 Hot chamber effects. Immediately after the continuous firing of the rounds in bursts from the specified weapons (200 rounds in the M249 and 150 rounds in the M16A1 and M231) a test cartridge shall be chambered but not fired. The maximum time allowed for the firing of the rounds shall not exceed two minutes. Thirty minutes must pass before any attempt to remove the cartridge is made because of the potential for cookoff. A cookoff during extraction of the cartridge can be hazardous. After 30 minutes, the round shall be fired, if possible, and the case extracted and examined. If the initial rounds cannot be fired in the allotted time, the weapon shall be cooled and the test repeated.

4.7.11 Sand and dust.

a. The general procedures outlined in TOP-3-2-045, (Type A fixture) shall be followed.

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b. The sand and dust mixture outlined in the TOP shall be used with the sand and dust feeder calibrated to dispense the mixture at a rate of 100 ± 25 grams per minute per square meter over the area concerned.

c. Lubricated weapons shall be placed in a mount inside the dust chamber, along with the required ammunition. All dust covers shall be closed.

d. The dust dispenser shall be turned on and allowed to operate for 1 minute before firing.

e. The function and casualty firing schedule for 500 rounds shall be followed for each weapon. The cyclic rate measurements are not required for this test. All fired cases shall be inspected for defects.

4.7.12 Corrosion. The sample (100 rounds linked and 300 rounds loose) shall be subjected to the salt-fog test outlined in method 509.2 of MIL-STD-810. After 48 hours of exposure to the 5% mixture, the sample shall be examined, its condition documented, and the loose rounds shall be loaded into magazines. The rounds shall then be chambered and fired in the specified weapons.

4.7.13 Temperature/humidity cycling.

a. One half of the sample cartridges shall be subjected to the conditioning schedule outlined in Table VI for a period of 10 days. The other half of the sample cartridges shall be set aside for testing in accordance with 4.7.14.b.

b. Following the storage period, the cartridges shall be fired for cyclic rate to the 500 round function and casualty firing schedule. The same firing schedule shall then be repeated with the exact same weapons using the non-conditioned half of the sample cartridges.

c. For each weapon type, record the average cyclic rate obtained with conditioned cartridges, the average cyclic rate obtained with cartridges that were not conditioned and their difference.

d. The estimated time required to clear any jams or stoppages shall be recorded for each incident.

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Table V. Attitude firing schedule.

<u>Fired from</u>	<u>Rounds</u>	<u>Mode</u>
M16A1 +85	60 90	S B
M16A1 0	60 90	S B
M16A1 -85	60 90	S B
M231 +85	150	B
M231 0	150	B
M231 -85	150	B
M249 +85	150	B
M249 0	150	B
M249 -85	<u>150</u>	B
Total	1350	

Key:

S = Single Shot

B = Bursts of 3 to 5 rounds each

Table VI. Temperature/humidity cycling conditioning schedule.

<u>Hours</u>	<u>Temperature (C)</u>	<u>Relative humidity (%)</u>
2 increase to	40.6	and 90
16 maintain at	40.6	and 90
2 decrease to	21.1	and 95
4 maintain at	21.1	and 95

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4.7.14 Continuous heating.

a. One half of the sample cartridges shall be subjected to continuous heating at 120°F and 15% relative humidity for 120 days.

b. After the conditioning period, the conditioned cartridges shall be fired in accordance with the function and casualty firing schedule for 500 rounds with cyclic rate measurements taken as indicated. The same firing schedule shall be repeated with the same weapons using the non-conditioned half of the sample cartridges.

c. For each weapon type, record the average cyclic rate obtained with conditioned cartridges, the average cyclic rate obtained with cartridges that were not conditioned and their difference.

d. The estimated time required to clear any jams or stoppages shall be recorded for each incident.

4.7.15 Continuous cooling.

a. One half of the sample cartridges shall be subjected to continuous cooling at -40°F for 30 days.

b. After the conditioning period, the conditioned cartridges shall be fired in accordance with the function and casualty firing schedule for 500 rounds with cyclic rate measurements taken as indicated. The same firing schedule shall be repeated in the same weapons using the non-conditioned half of the sample cartridges .

c. For each weapon type, record the average cyclic rate obtained with conditioned cartridges, the average cyclic rate obtained with cartridges that were not conditioned and their difference.

4.7.16 Rough handling. One half of the total sample plus 75 rounds shall be placed (loose) in M2A1 ammunition containers, with between 100 and 200 rounds in each container. The interior surfaces of the M2A1 cans shall be free of paint. Up to three containers shall be placed on the test table and subjected to the loose cargo test #14 of drawing 8837375 testing on only one surface.

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a. Following the test period, the conditioned cartridges shall be fired in accordance with the function and casualty firing schedule for 500 rounds with the cyclic rates recorded as indicated. The same firing schedule shall be repeated with the non-conditioned cartridges in the same weapon.

b. For each weapon type, record the average cyclic rate obtained with conditioned cartridges, the average cyclic rate obtained with cartridges that were not conditioned and their difference.

c. The estimated time required to clear all jams and stoppages shall be recorded for each incident.

d. The 150 extra cartridges shall be waterproof tested in accordance with 4.7.3. The cartridges shall be checked for compliance with 3.4.3.

4.7.17 Toxic fumes. Five trials of 30 rounds for the M16A1, M16A2 and M231 weapons and five trials of 100 rounds for the M249 machine gun shall be fired in short bursts inside a 2130mm cube container with the muzzle through the side of the chamber. Draw air samples continuously from the chamber to monitor for carbon monoxide, ammonia, nitrogen dioxide and sulfur dioxide. Repeat the test with standard M193 cartridges for reference.

4.7.18 Safety hazard classification. The test shall be conducted by the contractor at the facility of his choosing at his expense. The Government reserves the right to observe all testing. The tests shall be conducted in accordance with TB 700-2 paragraph 5-3e Single stack test, and 5-3g External fire stack test utilizing one outer packing unit placed on a wood stand.

4.7.19 Explosive sensitivity. Upon design submission the ARDEC Safety Office shall determine which materials utilized in the cartridge require sensitivity evaluation testing by the contractor. The sensitivity tests required shall be as identified on Table VI.

4.7.20 Test validity. If, for any reason, the proving ground considers that the test conditions have detrimentally affected the test results, the test shall be declared invalid and a new test shall be performed with additional samples.

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4.7.21 Defect penalty. In any ballistic test in which the occurrence of a firing defect prevents a reliable result for the characteristic being tested, an additional shot shall be fired. That particular test shall not be penalized, but the defect shall be added to the function and casualty defect count for each weapon type.

4.7.22 Packaging, packing and marking. Inspections for linking, packaging, packing and marking shall be in accordance with MIL-STD-644 as applicable to the drawing or as required by the contract. 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. All non-conforming cartridges shall be rejected.

4.7.23 Inspection equipment. The contractor shall submit inspection equipment designs for approval in accordance with the terms of the contract. (See Section 6 of MIL-A-48078 and 6.3 herein.)

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Table VII. Explosive sensitivity tests.

<u>Test</u>	<u>Test Document</u>	<u>Test Procedure/ Paragraph</u>
a. Friction Test - Apparatus and comparison values	JSSPM	5.3
b. Impact Test - Apparatus and comparison values	JSSPM TB 700-2	4.2 5.2i
c. Electrostatic discharge test - Apparatus and comparison values	JSSPM	4.2
d. Auto ignition temperature	JSSPM	5.9
e. Explosive temperature (5 Sec)	MIL-STD-650	506.1
f. Detonation test	TB 700-2	5.2f
g. Ignition and unconfined burning test	TB 700-2	5.2g
h. Thermal stability test	TB 700-2	5.2h
i. Card gap test	TB 700-2	5.2j

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5. PACKAGING

5.1 Level A. The cartridge shall be packed in accordance with 10542291 or 12590316 as required by the contract. The requirements of paragraph 5.2.1 shall take precedence over the drawings.

5.2 Level B. The contractor shall apply his best-effort to design, fabricate and test a package to transport and store any cartridge developed by this document. The contractor shall design packages to accommodate cartridges in linked and unlinked configurations. The design of the packages shall use military or federal specifications as much as possible and shall meet the requirements of Method 1A of MIL-P-116 and the appropriate section of the Code of Federal Regulations, Title 49, section 173.101. The contractor shall submit the packaging designs to the Packaging Division, ARDEC, for approval prior to fabrication of the packaging and performance of engineering tests. Level 3 drawings of the packaging and marking shall be forwarded to the Packaging Division for review and, if necessary, comment. paragraphs 5.2.1 through 5.2.3.3.2 are applicable for Level B packaging.

5.2.1 Unit package.

5.2.1.1 Linked cartridges. The linked cartridges shall be linked with the M27 Link (Drawing No. 11691287) and packed as shown on drawing 9357936, utilizing the M249 ammunition magazines (Drawing 9357903).

5.2.1.2 Unlinked cartridges. Thirty cartridges shall be packed in a unit package (i.e. fiberboard/paperboard box).

5.2.2 Intermediate packaging/packing. The development of the intermediate packaging/packing shall take into consideration the requirements listed in 5.2 and the requirements to pass the tests listed in 5.2.3. The quantity of linked cartridges in the intermediate packing boxes shall be 800. The quantity of unlinked cartridges in the intermediate packing boxes shall be 1200. The intermediate packing boxes shall meet the requirements of PPP-B-636. Two intermediate packs shall be packed in a bag per method 1A of MIL-P-116 and placed in an outer package. The outer pack shall meet the requirements of PPP-B-636, class-Weather Resistant.

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5.2.3 Tests. In order to insure packaging performance, tests as identified below from drawing 8837375 shall be performed on the outer package by the contractor and witnessed by the Government.

5.2.3.1 Temperature conditioning. Tests shall be performed at +160°, +70°F (ambient) and -65°F. Except for +70°F, the packaged-ammunition shall be conditioned for a minimum of 16 hours immediately prior to each test. During the performance of the test the temperature requirement shall be met by (a) using portable conditioning equipment where the ambient air temperature is maintained for the duration of the random vibration tests or (b) conditioning the items and testing as quickly as possible after removal from the conditioning chamber to maintain the specified temperature level as close as possible to the required level for loose cargo and the shock tests.

5.2.3.2 Test sample. Twelve loaded boxes (outer packages) shall be considered a test sample. Unless otherwise specified, at each temperature, two boxes will be subjected sequentially to random vibration tests (figures 1, 2, and 3 in Appendix E) on three mutually perpendicular axis and tests 2 (free fall drop), 13 (seven foot drop) and 14 (loose cargo) in accordance with drawing 8837375. The remaining six boxes will be subjected to a forty foot drop test, test 12, in accordance with drawing 8837375 with two boxes dropped at each temperature. Orientation of the boxes for the test shall be as specified on drawing 8837375.

5.2.3.3 Criteria for passing tests.

5.2.3.3.1 Physical condition. At the conclusion of the random vibration tests, test 2, test 13 and test 14, the packaged ammunition shall be safe to handle and operable. The decision that the ammunition has not met or failed to meet "safe and operable" is based upon the firing of the ammunition in the applicable weapons. Mechanical or physical damage to the ammunition which precludes the normal function of the ammunition is cause for rejection. The package (container) shall not spill its contents, must be capable of being handled, stacked, stored and must not compromise ammunition protection. However, minor damage to the exterior container: loose nails, split wood, bent box hardware, dents in fiber/metal container, etc., are permissible and are not cause for container rejection.

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5.2.3.3.2 Explosive elements. At the conclusion of test 12, no explosive element shall have burned or detonated and ammunition shall be safe to dispose by applicable handling and disposal regulations without injury to personnel. Attempts to fire the cartridges shall not result in an unsafe condition.

5.3 Level C. Packaging shall be the same as for Level B.

5.4 Unitization. All ammunition must be unitized for shipment and storage. Level A unitization procedures will be furnished by the Government. Level B unitization shall be in accordance with drawing 19-48-4168.

5.5 Marking. The boxes shall be marked per MIL-STD-129 and Code of Federal Regulations, Title 49 and United Nations - Transport of Dangerous Goods, section 9.

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 cartridges covered by this specification are intended for use in the M16 A1 and M16A2 Rifles with M15A2 Blank Firing Adapter (BFA), M231 Sub-Machine Gun with M22 BFA and M249 Machine Gun with M15A2 BFA.

6.2 Acquisition 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 2.1.2).
- c. Requirements for submission of first article sample.
- d. Type and level of packing for the cartridges.
- e. Provisions for the submission of Inspection Equipment Designs (see 6.3).
- f. Provisions for the submission of acceptance inspection reports containing final inspection results for each lot of ammunition presented to the Government (see 6.4).

6.3 Submission of inspection equipment designs for approval. (See MIL-A-48078). Submit inspection equipment designs as required by the contract 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.

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6.4 Submission of test data. Distribution of records shall be in accordance with the contract.

6.5 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 fires, explosions, adverse environment, rough handling, corrosive atmosphere, and electrically induced incidents. Such measures shall include the employment of an effective safety program that addresses the inherent hazards associated with the cartridge.

6.6 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 Edgewood Arsenal, Frankford Arsenal, Rock Island Arsenal, U.S. Army Armament Research and Development Command (ARRADCOM), U.S. Army Armament Research and Development Center (ARDC), or Picatinny Arsenal drawings. Technical data originally prepared by these activities is now under the cognizance of ARDEC.

6.7 Subject term (key word) listing.

Small Caliber Training Ammunition
 Small Caliber Armaments
 Small Caliber Test Procedures
 Trichloroethane

6.8 Definitions.

$$\text{Reliability} = 1 - \frac{\text{Number of Stoppages}}{\text{Number of Rounds Fired}}$$

Degradation of reliability - For the purpose of this specification the degradation of reliability of the cartridge is determined by the following equation:

$$\text{Reliability Degradation} = \text{Reliability (control)} - \text{Reliability (test)}$$

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6.9 Submission of alterantive quality conformance provisions. Unless otherwise specified in the 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.

Custodian:
Army-AR

Preparing activity:
Army-AR

Project (1305-AE31)

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APPENDIX A

RESIDUAL STRESS TEST PROCEDURE

10.0 SCOPE

10.1 Scope. This appendix gives test procedure for performing the residual stress test.

20.0 APPLICABLE DOCUMENTS

This section is not applicable to this appendix.

30.0 PURPOSE

30.1 Purpose. The residual stress test is performed to determine if the residual stress in polyethylene cases is great enough to cause splits or cracks in service or during long term storage.

40.0 EQUIPMENT

40.1 Equipment. Equipment to be used shall be submitted to the Government (see 6.3) for approval.

40.2 Test samples. Test samples shall consist of complete sets of the quantity of parts specified with the exception of propellant and primer (inert cartridge). Process the components on the production line and assemble to meet all final assembly dimensional requirements.

40.3 Safety requirements. Heat resistant gloves shall be worn when handling heated test samples and trays.

50.0 TEST PROCEDURES

50.1 Test procedures. The following test procedures shall be followed:

a. Immerse the test samples in the detergent. Seal detergent coated samples in polyethylene bags to minimize evaporation and place on an aluminum tray. Place the tray with the sealed bags of test samples in an oven set at $+160^{\circ}\text{F} \pm 5^{\circ}\text{F}$ for seven days.

b. After seven days remove the tray from the oven and cool for one hour. Rinse the inert test samples in running water to remove the detergent. Dry with clean rags or paper towels. Coat the surfaces with machinist's dye and wipe with rags or towels removing all excess dye on the surfaces.

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APPENDIX A

c. Examine the surfaces for cracks, splits and crazing using a 7 power eye loop or magnifying glass.

60.0 RECORDING THE DATA

60.1 Data. Record the following:

- a. Date of test.
- b. Test ammunition lot number and specification number.
- c. Cracks - Number, size and location (Dwg. 7643674).
- d. Splits - Number, size and location (Dwg. 7643674).
- e. Crazing - Number, size and location (Dwg. 7643674).
- f. Technician.
- g. Foreman

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APPENDIX B

CHEMICAL COMPATIBILITY TEST PROCEDURE

10.0 SCOPE

10.1 Scope. This appendix gives test procedures for performing ~~the~~ chemical compatibility tests.

20.0 APPLICABLE DOCUMENTS

This section is not applicable to this appendix.

30.0 PURPOSE

30.1 Purpose. To determine the durability of cartridges when brought into contact with various lubricants, cleaners and solvents used or available for use, in weapon and military vehicle maintenance.

40.0 EQUIPMENT

40.1 Equipment. Equipment used in this test shall be approved by the Government (see 6.3) prior to testing.

40.2 Weapons. Weapons shall conform to the dimensions shown on the applicable drawings.

40.3 BFA. BFA's shall conform to the dimensions shown on the applicable drawings.

40.4 Lubricants. The lubricants, solvents and chemicals to be used are as specified in section 3.

50.0 TEST PROCEDURES

50.1 Pre-firing. The following procedure shall be followed.

a. The weapon containing a BFA shall be assembled in the test fixture.

b. 100 cartridges per test condition, for conditioning, for each weapon shall be selected. The cartridges shall be visually examined for obvious defects which shall be noted on the test form.

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APPENDIX B

c. The test cartridges shall be immersed in each assigned chemical for one minute at a depth of 2.54 cm (1 inch) above the case rim with the cartridge laid horizontally to the chemical. After one minute the cartridges are removed, set base down in a storage rack and allowed to drain naturally for 24 hours.

d. After the 24 hour dripping period, the cartridges shall be wiped and inspected for abnormalities. The results shall be recorded on the test form.

50.2 Firing. Each cartridge shall be fired as designated from each gun and observed for functioning. The firing sequence in each weapon shall be as follows: 100 rounds control ammunition (unexposed to the chemicals) fired in short bursts. The weapon shall be cleaned and 100 rounds from the first test condition fired in short bursts. The fired cases shall be inspected and all ammunition-related stoppages recorded. The weapon shall be cleaned and the firing sequence repeated for the next test condition. If function problems are encountered with any of the test conditions, the weapon will be inspected and cleaned and an additional 100 control rounds fired before the test continues. The sequence shall be repeated until all test conditions are fired.

60.0 RECORDING THE DATA

60.1 Data. Record the following:

- a. Date of test.
- b. Test ammunition lot number and specification number.
- c. Ammunition temperature.
- d. Gun room temperature.
- e. Weapon type and serial number.
- f. Number of shots through gun.
- g. Weapon headspace.
- h. Firing pin protrusion.
- i. Firing pin indent.
- j. Number of cartridges fired.
- l. Measured cartridge dimensions.
- m. Any abnormalities.
- n. Test personnel.

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APPENDIX C

FUNCTION AND CASUALTY TEST PROCEDURE

10.0 SCOPE

10.1 Scope. This appendix gives test procedures for performing the function and casualty test.

20.0 APPLICABLE DOCUMENTS

This section is not applicable to this appendix.

30.0 PURPOSE

30.1 Purpose. The purpose of the Function and Casualty test is to determine whether or not the ammunition undergoing acceptance can be expected to perform satisfactorily, under conditions of field usage, in the service weapons for which it has been designed. Casualties and malfunctions can be caused either by the ammunition or by the weapon in which it is fired, so that, to a certain extent, these two factors are interdependent. A faulty or poorly adjusted weapon can cause casualties in normal ammunition, but if the weapon is in proper condition when the casualties are encountered the fault lies with the ammunition.

40.0 EQUIPMENT

40.1 Equipment. Equipment shall be submitted (see 6.3) for approval by the Government.

40.2 Cyclic-Rate Timer. Suitable recording instrument that will permit measurements within $\pm 2\%$ of the true rate of fire.

50.0 TEST PROCEDURE

50.1 Pre-firing (Preparation for test). The following procedure shall be followed:

a. Weapons shall be of the latest design and shall conform to the applicable specification. The barrels of the weapons shall be thoroughly cleaned and carefully examined using a borescope. The condition of the barrel shall be recorded.

b. The weapon containing a blank firing attachment (torqued to 50 in.-lb, rein) is assembled in the test fixture on the mount. For qualification only, the weapons to be used for testing at -55°C and $+68^{\circ}\text{C}$ shall be temperature conditioned at the respective test temperature in accordance with 4.7.2

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c. The test cartridges being linked or loaded into magazines shall be examined for obvious defects. If visual defects are found, the defective cartridge(s) shall be replaced and the defects shall be noted on the test sheet form.

d. Every 500 rounds of linked ammunition shall be prepared as two 200 round belts and one 100 round belt.

e. After the cartridges have been linked or loaded into magazines, they shall be conditioned at the required temperature for not less than two hours.

50.2 Firing. The following procedure shall be followed:

a. Upon completion of storage, high or low temperature, the cartridges shall be placed in an insulated box which has also been conditioned at the specified temperature. The insulated box containing the cartridges is then placed at a point convenient to the technician. The cartridges are removed from the insulated box and fired.

b. Firing shall be conducted in 500-round segments in accordance with the firing schedules of Table CI. The 500-round segments shall be repeated until the required test quantity is fired. The round counts for the M249 shall be estimated.

c. No more than 30 seconds delay is permitted between magazines.

d. Cooling of the weapon to ambient temperature with forced air shall be performed as required by the firing schedule. BFA's shall be checked and tightened upon weapon cooling.

e. Fired cases shall be visually examined by the technician for possible case casualties.

50.3 Cyclic rate.

50.3.1 Cyclic rate measurements. Cyclic rate measurements shall be taken as indicated on the firing schedule. For the M16A2 cyclic rates shall be taken on the first complete three-round burst fired from a magazine. For the M16A1, M231 and M249, a minimum of 20 rounds must be recorded for the cyclic rate to be valid.

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APPENDIX C

50.4 Screen perforation with BFA. A paper sheet (4' x 4' minimum) of type AA-203 40 pound kraft, Type I, wrapping paper shall be stretched tightly over a rigid frame of the same size. This target shall be placed perpendicular to the BFA orifice 15' from the weapon. The screen shall be replaced as necessary to facilitate observation. All perforations shall be noted.

50.5 Breech flash. During firing, the breech of all weapons shall be observed for flash. Any occurrences shall be noted, as well as the relative magnitude of each occurrence. The criteria of Table IV applies.

50.6 Fouling. Cleaning or lubrication of the barrel or any part of the weapon is only permitted in between 500-round segments, after observation for excessive fouling has been made. Should excessive stoppages or malfunctions occur, the weapon shall be examined for evidence of excessive propellant fouling or excessive particle/shavings fouling as a possible cause. The results of the examination shall be noted. The gas tubes of each M16 or M231 series weapons shall be inspected for gas tube fouling.

50.7 Cartridge ejection. Observe during function and casualty. A high speed camera shall be positioned so that the angle at which the cartridges are ejected in the horizontal plane can be determined. The preferred location for the camera is above the weapon, viewing downward at the ejection port. The angle shall be measured from an imaginary line which is drawn from the front to the rear of the weapon, to an imaginary line defined by the path of the ejected cases. The reference for the measurement of the angle shall be as follows:

a. The rear of the weapon shall be designated as 0 degrees.

b. The muzzle of the weapon shall be designated as 180 degrees.

c. A straight line out of the center of the ejection port, perpendicular to the weapon, shall be 90 degrees. High speed photography in a darkened range shall be utilized to determine the angle at which burning propellant will be ejected from the weapon. A minimum of 150 rounds in each weapon will be filmed and evaluated.

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APPENDIX C

60.0 RECORDING OF DATA

60.1 Casualties. Casualties shall be reported in accordance with the terminology specified in the applicable specification.

60.2 Misfires. Misfires shall be recorded and the cause described.

60.3 Function and Casualty. The function and casualty test requires careful attention and alertness, and any unusual occurrences in gun function or appearance of fired cases shall be noted. Suspected trends and patterns should also be noted.

60.4 Failures. Failures of gun parts shall be shown on the ammunition report.

60.5 Time. The time required to clear any jams or stoppages shall be recorded for each incident.

60.6 Weapon. The following shall be recorded:

- a. Serial Number.
- b. Total number of cartridges fired in weapon.
- c. Total number of cartridges fired in Blank Firing. Attachment.
- d. Headspace measurement.
- e. Cyclic rate.

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APPENDIX C

TABLE CI. FIRING SCHEDULES

<u>M16A1</u>	<u>M16A2</u>	<u>M231</u>	<u>M249</u>
30 C CR	30 B CR	30 C - CR	50 C - CR
30 C CR	30 B CR	30 C - CR	50 C - CR
30 S	30 S	30 B	Cool
30 B	30 B CR	30 C - CR	50 B
30 C CR	30 S	30 B	50 C - CR
Cool	Cool	Cool	50 B
30 S	30 B CR	30 C - CR	Cool
30 B	30 S	30 B	50 C - CR
30 C CR	30 B CR	30 C - CR	50 B
30 S	30 S	30 B	50 C - CR
30 B	30 B CR	30 C - CR	Cool
Cool	Cool	Cool	50 C - CR
30 C CR	30 S	30 B	50 C - CR
30 S	30 B CR	30 C - CR	<u>clean/inspect</u>
30 B	30 S	30 B	500 Total
30 C CR	30 B CR	30 C - CR	
20 S	20 S	30 B	
Cool	Cool	Cool	
30 C CR	30 B CR	30 C - CR	
30 C CR	30 B CR	30 C - CR	
<u>clean/inspect</u>	<u>clean/inspect</u>	<u>clean/inspect</u>	
500 Total	500 Total	500 Total	

Key:

S = Single shot
B = Bursts of 3 to 5 rounds
C = Continuous fire
CR = Cyclic rate taken

NOTE: Check and tighten BFA's during all cooling periods.

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APPENDIX C

70.0 OPERATIONAL NOTES

70.1 Stoppages. In the event of excessive stoppages during firing of the test, a detailed check shall be made to determine whether the ammunition or the equipment is at fault. If the stoppages were caused by misfires, the check of the weapon shall include measurement of the firing-pin protrusion and firing-pin indent. To assist in determining whether ammunition or equipment is responsible for a stoppage, it is good practice to test the weapon in question using ammunition of known characteristics, and to test the ammunition in question by firing in another weapon of the same type. If it is established that some fault condition of the weapon is responsible for the stoppage, then the test shall be disregarded, the weapon shall be corrected or replaced and the tests shall be re-fired. If it cannot be established that the weapon or other equipment is at fault, then the stoppage shall be charged against the ammunition.

70.2 Misfires. If excessive misfires are encountered, the weapons shall be examined carefully to determine if the cause is attributable to the gun. In any ballistic acceptance test where a misfire occurs, a second attempt to fire the primer is not made. It is mandatory that a period of at least fifteen (15) minutes elapse after the misfire occurs before the action of the weapon is opened. The misfired cartridge is carefully removed *in* accordance with existing safety regulations, and preserved for further examination. All handling and examinations of misfired cartridges shall be conducted with due regard for the hazards involved. The weapon in which excessive misfires occur shall be thoroughly checked; it shall be disassembled and all component parts critically scrutinized. Results of such examinations shall be included on the test report as a matter of information.

70.2.1 Examination. Laboratory examination of the misfired cartridges shall be made to determine the specific cause. The result of the investigation is to be included on the test report.

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APPENDIX C

70.3 Firing defects. Upon completion of firing, all cartridge cases from the test ammunition shall be carefully examined for firing defects. If any defect is found, a detailed check of the equipment shall be made to determine whether the ammunition or the equipment is at fault. If it is established that a faulty weapon is responsible for the firing defect, then the test shall be disregarded, the weapon shall be corrected or replaced, and the tests shall be re-fired. If it cannot be established that the weapon or other equipment is at fault, then the stoppage shall be charged against the ammunition.

80.0 DEFINITIONS

80.1 Misfire. Failure of a cartridge to fire after initiating action is taken. There are two general categories of misfires:

- a. The primer fails to fire when struck by the firing pin.
- b. The propellant does not ignite when the primer fires normally.

80.2 Perforated primer. A perforated primer is one in which the indent in the primer cup, made by the firing pin, is entirely perforated. It can be identified by a visible hole through the primer, or if the perforation is minute, by discoloration of the indent caused by gas burning.

80.3 Primer leak. Discoloration caused by gas leakage around the junction between the primer cup and the primer pocket wall.

80.4 Loose primer. Looseness, but not so as to permit the fired primer to fall from the primer pocket after the cartridge is fired.

80.5 Blown primer or a primer which falls out of the primer pocket. A blown primer is a primer which, when the cartridge is fired, is separated completely from the head of the cartridge case, and both the head of the case and the pocket are enlarged and deformed. A primer which falls out of the primer pocket is in the same category as a blown primer but the distortion of the primer pocket is less obvious.

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80.6 Ruptured case. A circumferential separation of the case wall produced by firing. Ruptures are divided into two categories, partial and complete. A partial is one which extends less than 360° around the case. A complete rupture is one which extends entirely around the case. Ruptures are designated according to position, as indicated on drawing 7643674.

80.7 Split case. A longitudinal separation of the case produced by firing. Splits shall be classified as prescribed by the cartridge specification, and drawing 7643674.

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APPENDIX D

NOISE LEVEL TEST PROCEDURE

10.0 SCOPE

10.1 Scope. This appendix gives test procedures for performing the Noise Level Test.

20.0 APPLICABLE DOCUMENTS

This section is not applicable to this appendix.

30.0 PURPOSE

30.1 Purpose. To compare the noise level of test cartridges with the noise produced by control cartridges and to measure the noise level at the gunner's head position.

40.0 EQUIPMENT

40.1 Equipment. Equipment used in this test shall be approved by the Government (see 6.3) prior to testing.

40.2 Weapons and Blank Firing Attachments. weapons and Blank Firing Attachments shall conform to the dimensions shown on the applicable drawings.

50.0 TEST PROCEDURES

50.1 Pre-firing (preparation for test). The following procedure shall be followed:

a. Test and control cartridges shall be loaded into magazines, and conditioned at $70^{\circ} \pm 2^{\circ}\text{F}$ for a minimum of two hours.

b. The weapon shall be assembled in the test fixture on the mount.

c. A noise level meter is set up outside the firing room with a microphone placed inside the firing room.

d. A second microphone is placed at the right handed gunner's head position.

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APPENDIX D

e. The first microphone shall be placed in such a location in the firing room that the noise level produced by a burst of control cartridges is within the range specified in the requirement. This may entail firing more than one burst of control ammunition, with the microphone being moved to a new position for each burst fired, until the results comply with the requirement. When firing the test cartridges it is imperative that the microphone remain in the exact position as was used to obtain the specified level for the control cartridges.

50.2 During firing. The following procedure shall be followed:

- a. An observer is stationed at the noise level meter.
- b. The magazine containing the control cartridges shall be inserted into the weapon and fired full automatic.
- c. The noise levels are recorded.
- d. Without moving the microphones, a BFA shall be attached to the weapon. The magazines containing the test cartridges shall be-loaded into-the weapon and fired.

NOTE THAT SPECIAL ATTENTION IS REQUIRED SO THAT CARTRIDGES WITH BULLETS ARE NOT FIRED IN A WEAPON WITH A BFA ON IT. DOING SO MAY BE HAZARDOUS AND MAY CAUSE WEAPON DAMAGE.

- e. The noise levels are recorded.
- f. If the noise level at the right handed gunner's head position exceeds 135 decibels, the test shall be repeated with the microphone located at the left handed gunner's head position.
- g. Fired cases shall be visually examined by the technician for possible case casualties.

60.0 RECORDING OF DATA

60.1 Data. Record the following:

- a. Date of test
- b. Test ammunition lot number and specification number
- c. Ammunition temperature
- d. Gun room temperature
- e. Firing range temperature
- f. outdoor temperature
- g. Gun type and serial number
- h. Number of times the barrel has been fired
- i. Gun headspace

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- j. Firing pin protrusion
- k. Firing pin indent
- l. Case casualties
- m. Any abnormalities
- n. Gunner
- o. Foreman
- p. Location of microphones

60.2 Computations. Calculate the difference in noise levels between control and test cartridges.

60.3 Results. Show all the information on the data sheets plus the calculated noise level difference.

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APPENDIX E

PACKAGING TEST

10.0 SCOPE

10.1 Scope. This appendix gives the values that the random vibration is tested for.

20.0 APPLICABLE DOCUMENTS

This section is not applicable to this appendix.

30.0 TESTS

30.1 Random vibration test. The boxes shall be tested sequentially to the test requirements listed in figures E-1, E-2, and E-3.

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APPENDIX E

FIGURES FOR PACKAGING TEST

<u>VERTICAL AXIS*</u>		<u>TRANSFER AXIS*</u>		<u>LONGITUDINAL AXIS*</u>	
<u>FREQ.</u>	<u>PSD VALUE**</u>	<u>FREQ.</u>	<u>PSD VALUE**</u>	<u>FREQ.</u>	<u>PSD VALUE**</u>
5	.2300	5	.1373	5	.0605
17	.0154	9	.0900	15	.0241
20	.0235	14	.0427	16	.0350
22	.0109	16	.0496	19	.0092
24	.0109	18	.0229	37	.0029
26	.0154	119	.0008	41	.0060
69	.0018	146	.0013	49	.0017
79	.0048	166	.0009	105	.0006
87	.0028	201	.0009	125	.0004
123	.0063	273	.0053	143	.0013
161	.0043	298	.0021	187	.0013
209	.0057	371	.0104	219	.0028
224	.0150	382	.0019	221	.0068
247	.0031	402	.0077	247	.0325
278	.0139	422	.0027	249	.0096
293	.0037	500	.0016	270	.0026
357	.0028			293	.0094
375	.0052			336	.0120
500	.0011			379	.0085
				431	.0224
				433	.0092
				500	.0014

* TEST DURATION 120 MINUTES PER AXIS

**PSD-POWER SPECTRAL DENSITY--G SQ. PER HZ

FIGURE E-1. Random Vibration Schedule-Wheeled Vehicle.

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<u>VERTICAL AXIS*</u>		<u>TRANSFER AXIS*</u>		<u>LONGITUDINAL AXIS*</u>	
<u>FREQ.</u>	<u>PSD VALUE**</u>	<u>FREQ.</u>	<u>PSD VALUE**</u>	<u>FREQ.</u>	<u>PSD VALUE**</u>
5	.2252	5	.0474	5	.0536
8	.5508	6	.0303	5	.0536
10	.0437	7	.0761	8	.1102
13	.0253	13	.0130	13	.0140
15	.0735	15	.0335	16	.0303
19	.0143	16	.0137	20	.0130
23	.0358	21	.0102	23	.0378
27	.0123	23	.0268	27	.0079
30	.0286	25	.0090	30	.0208
34	.0133	28	.0090	33	.0068
36	.0416	30	.0137	95	.0019
41	.0103	34	.0055	121	.0214
45	.0241	37	.0081	146	.0450
51	.0114	46	.0039	153	.0236
95	.0266	51	.0068	158	.0549
111	.0166	55	.0042	164	.0261
136	.0683	158	.0029	185	.0577
147	.0266	235	.0013	314	.0015
185	.0603	257	.0027	353	.0096
262	.0634	317	.0016	398	.0009
330	.0083	326	.0057	444	.0027
360	.0253	343	.0009	500	.0014
500	.0017	384	.0018		
		410	.0008		
		462	.0020		
		500	.0007		

* TEST DURATION 120 MINUTES PER AXIS

**PSD-POWER SPECTRAL DENSITY--G SQ. PER HZ

FIGURE E-2. Random Vibration Schedule - Two-Wheeled Trailer.

MIL-C-70724(AR)
APPENDIX E

Test Phase (g ² /Hz)	5-500Hz Threshold (g ² /Hz)	No. Sweeps	NARROWBAND 1			NARROWBAND 2			NARROWBAND 3			NARROWBAND 4			NARROWBAND 5		
			RW (Hz)	PSD (g ² /Hz)	Sweep BW (Hz)	RW (Hz)	PSD (g ² /Hz)	Sweep BW (Hz)	RW (Hz)	PSD (g ² /Hz)	Sweep BW (Hz)	RW (Hz)	PSD (g ² /Hz)	Sweep BW (Hz)	RW (Hz)	PSD (g ² /Hz)	Sweep BW (Hz)
VERTICAL AXIS																	
(12 Minutes per test phase)																	
V1	0.0030	2	30-35	0.0649	3	60-70	0.0300	6	90-105	0.0236	9	20-140	0.0097	12	150-175	0.0128	15
V2	0.0018	2	41-47	0.0508	3	82-94	0.0562	6	123-141	0.0054	9	164-188	0.0067	12	205-235	0.0128	15
V3	0.0044	1	53-65	0.1096	6	106-130	0.0067	12	159-195	0.0531	18	212-260	0.0269	24	265-325	0.0485	30
V4	0.0032	1	71-88	0.1029	9	142-176	0.0698	18	213-264	0.0647	27	284-352	0.0280	36	355-440	0.0058	45
V5	0.0050	1	94-112	1.2065	9	188-224	0.5690	18	282-336	0.0583	27	376-448	0.0169	36	-----	-----	-----
TRANSVERSE AXIS																	
(12 minute per test phase)																	
T1	0.0015	2	30-35	0.0163	3	60-70	0.0222	6	90-105	0.0112	9	120-140	0.0054	12	150-175	0.0037	15
T2	0.0012	2	41-47	0.0165	3	82-94	0.0157	6	123-141	0.0078	9	164-188	0.0066	12	205-235	0.0129	15
T3	0.0040	1	53-65	0.0530	6	106-130	0.0241	12	159-195	0.0176	18	212-260	0.0091	24	265-325	0.0113	30
T4	0.0029	1	71-88	0.0535	9	142-176	0.1096	18	213-264	0.0358	27	284-352	0.0072	36	-----	-----	-----
T5	0.0024	1	94-112	0.2093	9	188-224	0.1296	18	282-336	0.0267	27	376-448	0.0094	36	-----	-----	-----
LONGITUDINAL AXIS																	
(12 minutes per test phase)																	
L1	0.0023	2	30-35	0.0190	3	60-70	0.0135	6	90-105	0.0055	9	120-140	0.0086	12	150-175	0.0062	15
L2	0.0012	3	41-47	0.0074	3	82-94	0.0115	6	-----	-----	-----	-----	-----	-----	-----	-----	-----
L3	0.0038	1	53-64	0.0414	6	106-130	0.0227	12	159-195	0.0131	18	212-260	0.0165	24	265-325	0.0161	30
L4	0.0028	1	71-88	0.0886	9	142-176	0.0095	18	213-264	0.0296	27	284-352	0.0210	36	355-440	0.0098	40
L5	0.0035	1	94-112	0.0985	9	188-224	0.1112	18	282-336	0.0431	27	376-448	0.0154	36	-----	-----	-----

FIGURE E-3. Narrowband Random-On-Random Vibration - Tracked Vehicle

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