

INCH-POUND

MIL-C-71167 (AR)
23 September 1993

MILITARY SPECIFICATION
CARTRIDGE, 7.62MM, M973 BALL
SHORT RANGE
TRAINING AMMUNITION
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 performance requirements, quality assurance provisions and preparation for delivery for Cartridge, 7.62mm Short Range Training Ammunition (SRTA) (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 are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

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

AMSC N/A

FSC 1305

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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SPECIFICATIONS

FEDERAL

O-I-503 - Insect Repellant
 P-D-680 - Dry Cleaning Solvent
 VV-L-800 - Lubricating Oil, General Purpose,
 Preservative (Water-displacing, Low
 Temperature)
 PPP-B-636 - Box, Shipping, Fiberboard

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-A-2550 - Ammunition, General Specification for
 MIL-L-14107- Lubricating Oil, Weapons, Low
 Temperature
 MIL-L-46000- Lubricant, Semi-Fluid (Automatic
 Weapons)
 MIL-L-46167- Lubricant 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 (Metric)

STANDARDS

MILITARY

MIL-STD-100- Engineering Drawing Packages
 MIL-STD-109- Quality Assurance Terms and Definitions
 MIL-STD-129- Marking for Shipment and Storage
 MIL-STD-480- Configuration Control - Engineering
 Changes, Deviations and Waivers
 MIL-STD-636- Visual 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

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MIL-STD-650- Explosives: Sampling, Inspection and Testing
MIL-STD-810- Environmental Test Methods for Aerospace and Ground Equipment
MIL-STD-1168- Lot Numbering of Ammunition
MIL-STD-1751- Military Standard, Safety and Performance Test for Qualifications of Explosives
MIL-STD-1904- Design and Test Requirements for Level A Ammunition Packaging

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

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

DRAWINGS (see 6.5)

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

PRODUCT DRAWINGS

6006874	-	"E" Cardboard Silhouette Target
6109086	-	"F" Cardboard Silhouette Target
7643674	-	Classification of Cartridge Case Defects Small Arms Ammunition
8421679	-	M31A2, Trainfire Target Holding Mechanism
12002898	-	"E" Polyethylene Silhouette Target
12002899	-	"F" Polyethylene Silhouette Target
12960929	-	Cartridge, 7.62mm Short Range, M973 Ball

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PACKAGING DRAWINGS

- 7553708 - Packing and Marking Cartridges, 7.62mm, NATO Cartons, Boxes, Ammunition, M19A1 Box, Wirebound
- 8593306 - Packing and Marking, Cartridges, 7.62mm, NATO, Linked, Box, Ammunition, M19A1, Box, Wirebound (Functional)
- 8597306 - Packing and Marking, Cartridges 7.62mm, NATO, Linked, Cartons, Bandoleers, Box, Ammunition, M19A1, Box, Wirebound (Functional)
- 8837375 - ARRADCOM Environmental Testing Criteria for OCONUS Shipping Containers
- 9362607 - Packing and Marking for Box, Wirebound for Cartridge, 7.62mm
- 10521861 - Packing and Marking Cartridges, 7.62mm, NATO, Linked, Cartons, Bandoleer, Box, Ammunition, M19A1, Box, Wirebound
- 10535780 - Packing, Cartridges, 7.62mm, Linked, Shipping and Storage Container, M548 (Functional)
- 10535781 - Marking Cartridges, 7.62mm, Linked, Shipping and Storage Container, M548

INSPECTION EQUIPMENT DRAWING

- LI12576485 - Inspection Equipment List, Function and Casualty

PUBLICATIONS

DEPARTMENT OF INTERIOR

Bureau of Mines

- Report 5624 - Laboratory Equipment and Test Procedures for Evaluating Explosibility of Dusts

DEPARTMENT OF DEFENSE

- SCATP-7.62 - Ammunition Ballistic Acceptance Test Methods Test Procedures for 7.62mm Cartridges
- TB-700-2 - Department of Defense Explosives Hazard Classification Procedures
- TOP-3-2-045 - TECOM Test Operating Procedure, Automatic Weapons, Machine Guns, Hand and Should Weapons
- TECP-700-700-Vol. III - Manual of Tests Methods for Small Arms Ammunition

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DEPARTMENT OF TRANSPORTATION

Code of Federal Regulations, Title 49

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

2.2 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the 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 Y14.5M-82 - Dimensioning and Tolerancing

(Application for copies should be addressed to ANSI, 1430 Broadway, New York, NY 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 cartridges shall comply with the requirements shown on drawing 12960929, reference 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 function the M60 Machine Gun using a standard bipod/tripod without any modification.

3.2 Qualification. A sample shall be submitted for qualification in accordance with the technical provisions specified herein (see Section 4). The purpose of the qualification is to verify that a particular contractor's design is capable of meeting the requirements of this specification. Upon qualification, the contractor's design shall be considered qualified indefinitely. The contractor shall submit level 3 detailed item drawings in accordance with MIL-STD-100, MIL-A-2550 and ANSI Y14.5-82 to the Government for configuration control. All changes shall be submitted in accordance with MIL-STD-480 for

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review and approval by the Government. The Government reserves the right to subject the revised design to any or all the qualification evaluations specified in 4.3 at the expense of the contractor.

3.3 First article. When specified in the contract or purchase order, a sample shall be subjected to first article inspection (see 4.4 and 6.2).

3.4 Performance characteristics.

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

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

3.4.1.3 Bullet pull. The force required to separate the bullet from the cartridge case shall not be less than 267N (60 lbf).

3.4.1.4 Waterproof.

3.4.1.4.1 Waterproof (bubble test). The cartridge shall release not more than one bubble of air when tested at a pressure 13.8 kPa (2 psi) below atmospheric pressure for 30 seconds. As an alternate procedure or for retesting, use the waterproof (firing) procedure below.

3.4.1.4.2 Waterproof (firing test). After immersion in 20°C (68°F) water for 24 hours, the mean velocity of the test cartridges shall not vary from the mean velocity obtained in the 20°C dry test by more than ± 30 mps (98 fps).

3.4.2 Chamber pressure. The mean chamber pressure of cartridges, using a Government approved piezoelectric transducer, conditioned at 20°C (68°F) shall not exceed 365 MPa (52,940 PSIG). The chamber pressure of any individual cartridge shall not exceed 400 MPa (58,016 psig).

3.4.2.1 Chamber pressure at extreme temperatures. The mean chamber pressure of cartridges conditioned at 40°C (104°F) and -20°C (-4°F) shall not increase more than 50 MPa (7,250 psi) above the mean chamber pressure obtained at 20°C. The chamber pressure of any individual cartridge, conditioned at -55, 20, 50 and 68°C (-65, -4, 122 and 165°F), shall not exceed 400 MPa (58,016 PSIG). Decreased chamber pressure is acceptable.

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3.4.3 Velocity. The mean velocity of cartridges conditioned at 20°C (68°F) measured at 23.77 m (15 ft) from the muzzle of the weapon shall not vary more than $\pm 6\%$ from the design velocity. The design velocity is the mean velocity (uncorrected) obtained during qualification testing at 20°C.

3.4.3.1 Velocity at extreme temperatures. The mean velocity of cartridges conditioned at 40°C (104°F) and -20°C (-4°F) shall not vary by more than $\pm 10\%$ from the mean velocity at 20°C.

3.4.4 Action time. The action time (overall primer ignition, propellant burning, plus the time taken for the bullet to exit the barrel) of cartridges conditioned at 20°C (68°F), 40°C (104°F) and -20°C (-4°F) shall not exceed 4 ms.

3.4.5 Dispersion. The average mean radii of all 10-round targets fired at a distance of 100 meters (m) from the muzzle shall not exceed 78mm.

3.4.6 Function and casualty. The cartridge shall function without casualty within the temperature range of -20° to 40°C in the M60 Machine Gun. The cartridge shall safely function (no critical firing defects) within the temperature range of -55°C to 68°C.

3.4.6.1 Cyclic rate. The cartridge shall function in the M60 Machine Gun using standard bipod/tripod at an average cyclic rate between 500 and 650 rounds per minute within the temperature range of -20°C to 40°C.

3.4.6.2 Noise level. The noise level of the cartridges shall be greater than 100 decibels when the noise level of ball cartridges fired under identical conditions is between 120 and 130 decibels. The noise level of the cartridges at the gunner's ear position shall not exceed 164 decibels.

3.4.6.3 Breech flash. Firing the cartridges shall not cause breech flash which would endanger the shooter.

3.4.6.4 Hot chamber effects. A cartridge inserted into the chamber immediately following the firing of 200 cartridges shall not fire (cook off). In addition, the cartridge shall not deform to the extent that clearing of the weapon is made difficult following the proper waiting period.

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3.4.6.5 Chemical compatibility. The cartridge shall be safe to store and fire (no critical defects as defined by Table IV) when subjected to the lubricants and solvents listed below. The reliability of the cartridge shall not degrade by more than 0.10 after exposure to the following substances (see 6.8.2):

Material	Specification
Bore Cleaner (RBC)	MIL-C-372
Insect Repellant	O-I-503
Dry-cleaning Solvent (SD-1)	P-D-680
Lubricating Oil (PL-S)	VV-L-800
Lubricating Oil (ICE, T)	MIL-L-2104
Lubricating Oil (LAW)	MIL-L-14107
Lubricating Oil (LSA)	MIL-L-46000
Lubricating Oil (ICE, A)	MIL-L-46167
Lubricant (CLP)	MIL-L-63460

3.4.6.6 Bullet integrity. The bullet of the cartridge shall not burst or fragment in the barrel or during its effective range when fired.

3.4.6.7 Fouling. The fouling produced by firing 1000 rounds shall be readily removable through standard cleaning methods and shall not cause a change in the cyclic rate greater than 15%. The average mean radius of all targets (at 100 meters) fired after the firing of the 1000 fouling rounds, shall not exceed 105mm (4.13 inches).

3.4.6.8 Target kill. The test cartridges shall mark standard polyethylene and cardboard "E" and "F" silhouette targets sufficiently to indicate target hits, and activate standard target mechanisms at a range of 100 meters.

3.4.6.9 Attitude. The cartridge shall be safe to fire (no critical defects as defined by Table IV) and the reliability shall not degrade by more than 0.10 (see 6.8.2) when fired at elevations between $\pm 85^\circ$.

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3.4.6.10 Maximum range. The maximum range of the cartridge (when fired at standard atmospheric conditions) shall be no greater than 600 meters. All bullets of cartridges fired at the maximum range shall impact the ground within a safety fan defined as 5° to the left and 5° to the right of the line of fire.

3.4.7 Port pressure. The average port pressure of the sample cartridges, when conditioned for not less than 2 hours at 68°F to 72°F and fired at that temperature, shall not be greater than 85 MPa (12,238 psi) and shall not be less than 60 MPa (8,702 psi).

3.4.8 Trajectory. The trajectory of the projectile shall match, within ± 1 mil, the trajectory of the 7.62mm, M80, Ball service cartridge, at all ranges out to 100 meters. Trajectory assessment shall be prior to production of first article. The velocity requirement established at this time will control trajectory match for production ammunition.

3.5 Environmental.

3.5.1 Sand and dust. The cartridges shall be safe to fire (no critical defects as defined in Table IV) when being subjected to sand and dust.

3.5.2 Corrosion. The cartridge shall be safe to store and fire (no critical defects as defined in 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 as defined in Table IV) after being subjected to a 4-day temperature/humidity cycle. The reliability of the cartridge shall not degrade by more than 0.05 (see 6.8.2) and the cyclic rate shall not change by more than 15% after being subjected to the temperature/humidity cycle.

3.5.4 Long term high temperature. The cartridge shall be safe to store and fire (no critical defects as defined in Table IV) after being subjected to 120 days continuous heating at 40°C (104°F). The reliability of the cartridge shall not degrade by more than 0.05 (see 6.8.2) and the cyclic rate shall not change by more than 15% when the cartridge is subjected to continuous heating.

3.5.5 Long term low temperature. The cartridge shall be safe to store and fire (no critical defects as defined in Table IV) after being subjected to 30 days continuous cooling at -40°C (-40°F). The reliability of the cartridge shall not

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degrade by more than 0.05 (see 6.8.2) and the cyclic rate shall not change by more than 15% when the cartridge is subjected to continuous cooling.

3.5.6 Sequential rough handling. After the packaged cartridges are sequentially subjected to a 3-foot drop test, a loose cargo test and a 7-foot drop test, and bare cartridges are subjected to a 5-foot drop test, the container shall be functional and suitable for its intended function and the cartridges shall be safe to store, handle and fire. After packaged cartridges are subjected to a 40-foot drop test, the cartridges shall not detonate, deflagrate or exhibit propellant spillage and shall be safe to handle and dispose of.

3.5.7 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 firing similar quantities of 7.62mm, Ball M80 ammunition.

3.5.8 Secure cargo (transportation/vibration). After being subjected to the secure cargo (transportation/vibration) tests, the test cartridge shall be safe to store, handle and fire and the container shall be functional and suitable for its intended purpose.

3.6 Safety.

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

DOD Hazard Class/Div/SCG: 1.4S
DOD Storage Compatibility Group: S
DOT Hazard Class: 1.4S
DOT Container Marking: Cartridges, Small Arms
UN Serial Number: 0012

3.6.2 Net explosive weight. The net explosive weight of the cartridge (sum of propellant, primer and any other pyrotechnic material) shall not exceed 45 grains.

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3.6.3 Explosive sensitivity. Explosive sensitivity data for all materials utilized in the cartridge must be on file with the ARDEC Safety Office. The sensitivity for these materials shall be as indicated below:

<u>Sensitivity Test</u>	<u>Results</u>
a. Impact, ERL type 12 tool 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)

3.7 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. Salvage operations or rework shall not be permitted without prior approval of the contracting officer.

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

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

4.2 Classification of inspections. 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 60,000 cartridges as designated by the Contracting Officer for evaluation in accordance with the provisions of 4.3.3.

4.3.2 Qualification sample. The qualification sample shall be of the same design as will be submitted for normal 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 MIL-A-48078 and Table I. Examination for critical, major and minor defects shall be performed in accordance with Table I. the sample to be examined shall be drawn in such a way that it is representative

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of the entire quantity submitted. Nonconforming cartridges shall be rejected and put aside for further examination. Disposition instructions for nonconforming cartridges shall be provided by the contracting officer.

4.3.4 Rejection. See MIL-A-48078. 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.

4.3.5 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 **MIL-C-71167(AR)**

PARAGRAPH	TITLE	SHEET 1 OF 5		DRAWING NUMBER 12960929 NEXT HIGHER ASSEMBLY
		EXAMINATION OR TEST	CONFORMANCE CRITERIA	
	Cartridge, 7.62mm, M973, Short Range Training, Ball			
	Examination for Defects Major Class Minor Class Primer Sensitivity Residual Stress Bullet Pull Waterproof EPVAT (Electronic Chamber & Port Pressures, Velocity, Action Time) -55 C -20 C +20 C +40 C +68 C Dispersion	Sample ACC-REJ 346 0 - 1 103 0 - 1 500 1/1 100 0 - 1 100 0 - 1 50 11 - 16 100 26 - 27 40 1/1 60 1/1 60 1/1 60 1/1 40 1/1 300 1/1	3.1 3.4.1.1 3.4.1.2 3.4.1.3 3.4.1.4 3.4.1.5 3.4.2 3.4.3 3.4.4 3.4.7 3.4.5	Table V 4.6.1 4.6.2 4.6.3 4.6.4, 4.6.5 4.6.6 4.6.7
NOTES: 1/ Check for compliance with the requirement.				

Replaces 1570, 1 Feb 85, which may not be used

AMSMC Form 1570b, 1 Jul 89

TABLE I. Qualification
CLASSIFICATION OF CHARACTERISTICS **MIL-C-71167(AR)**

PARAGRAPH	TITLE	SHEET 2 OF 5		DRAWING NUMBER 12960929
		EXAMINATION OR TEST	CONFORMANCE CRITERIA	
	Cartridge, 7.62mm, M973, Short Range Training, Ball			NEXT HIGHER ASSEMBLY
CLASSIFICATION				INSPECTION METHOD REFERENCE
	Function & Casualty	-55 C <u>3</u> +68 C <u>3</u> +20 C <u>2</u> -20 C <u>2</u> +50 C <u>2</u>	Sample ACC-REJ 500 <u>1</u> 500 <u>1</u> 7500 Table IV 7500 Table IV 7500 Table IV	4.6.8, 4.6.8.1
	Cyclic Rate		-- <u>1</u>	4.6.9 <u>4</u>
	Noise		60 <u>1</u>	4.6.10
	Breechflash Critical Major Minor		0 - 1 18 - 19 74 - 75	4.6.11 <u>4</u>
NOTES:	<u>1</u> Check for compliance with the requirement. <u>2</u> Divided equally among 5 weapons. <u>3</u> Both the test weapons and ammunition shall be temperature conditioned. <u>4</u> Conducted simultaneously with function and casualty.			

Replaces 1570, 1 Feb 85, which may not be used

AMSMC Form 1570b, 1 Jul 89

TABLE I. Qualification

CLASSIFICATION OF CHARACTERISTICS

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PARAGRAPH	TITLE	SHEET 3 OF 5		DRAWING NUMBER 12960929 NEXT HIGHER ASSEMBLY
		EXAMINATION OR TEST	CONFORMANCE CRITERIA	
	Cartridge, 7.62mm, M973, Short Range Training, Ball			
	Hot Chamber Effects	<u>5</u>	Sample ACC-REJ 400 <u>1</u>	3.4.6.4 4.6.12
	Chemical Compatability		1100 <u>1</u>	3.4.6.5 4.6.13
	Bullet Integrity		<u>6</u>	3.4.6.6 4.6.14 <u>4</u>
	Fouling		-- 3300 <u>1</u>	3.4.6.7 4.6.15
	Target Kill		Cyclic Rate Test Accuracy Test <u>1</u>	3.4.6.8 4.6.16
	Attitude		160 450 <u>1</u>	3.4.6.9 4.6.17
NOTES:	<p><u>1</u> Check for compliance with the requirement. <u>4</u> Conducted simultaneously with function and casualty. <u>5</u> Conducted twice with 200 rounds each time. <u>6</u> 100 rounds will be evaluated at each temperature (+20 C, -20 C, +40 C). The results of all 3 temperatures combined shall meet 300-4-5. <u>1</u> Divided equally among 3 weapons.</p>			

TABLE I. Qualification
CLASSIFICATION OF CHARACTERISTICS **MIL-C-71167(AR)**

PARAGRAPH	TITLE	SHEET 4 OF 5		DRAWING NUMBER 12960929 NEXT HIGHER ASSEMBLY
		EXAMINATION OR TEST	CONFORMANCE CRITERIA	
	Cartridge, 7.62mm, M973, Short Range Training, Ball			
	Maximum Range	Sample 480	ACC-REJ 1/	3.4.6 4.6.18
	Trajectory	100	1/	3.4.8 4.6.29
	Sand & Dust	500	1/	3.5.1 4.6.19
	Corrosion	100	1/	3.5.2 4.6.20
	Temperature/Humidity Cycling	1000	1/	3.5.3 4.6.21
	Long Term High Temperature	1000	1/	3.5.4 4.6.22
	Long Term Low Temperature	1000	1/	3.5.5 4.6.23
	Secure cargo	4000	1/	3.5.8 4.6.28
NOTES: 1/ Check for compliance with the requirement.				

TABLE I. Qualification

CLASSIFICATION OF CHARACTERISTICS

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PARAGRAPH	TITLE	SHEET 5 OF 5		DRAWING NUMBER 12960929 NEXT HIGHER ASSEMBLY
		EXAMINATION OR TEST	REQUIREMENT PARAGRAPH	
CLASSIFICATION	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE	
	Cartridge, 7.62mm, M973, Short Range Training, Ball			
	Sequential Rough Handling	Sample ACC-REJ 8/	3.5.6	4.6.24
	Waterproof	150 1/	3.4.1.4	4.6.4, 4.6.5
	Toxic Fumes	150 1/	3.5.7	4.6.25
	Safety Hazard Classification	9/	3.6	4.6.26
	Explosive Sensitivity	10/	3.6.3	4.6.27
NOTES:	<p>1/ Check for compliance with the requirement. 8/ Utilize samples from secure cargo testing.</p> <p>9/ 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.</p> <p>10/ 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>Name</u>	<u>Drawing</u>	<u>Quantity</u>
Cartridge, 7.62mm, M973 Ball, Short Range Training Ammunition	12960929	20,000

4.4.2 Inspections to be performed. As required by the contract, the first article sample shall be subjected to all of the examinations and tests specified in Table II. As determined by the Government, the first article sample may be subjected to any or all requirements of the applicable drawings.

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

TABLE II. First article inspection
CLASSIFICATION OF CHARACTERISTICS **MIL-C-71167(AR)**

PARAGRAPH	TITLE	SHEET 1 OF 3		DRAWING NUMBER 12960929	NEXT HIGHER ASSEMBLY
		EXAMINATION OR TEST	CONFORMANCE CRITERIA		
	Cartridge, 7.62mm, M973, Short Range Training, Ball				
CLASSIFICATION					
	Examination for Defects Major Class Minor Class Primer Sensitivity Residual Stress Bullet Pull Waterproof EPVAT (Electronic Chamber & Port Pressure, Velocity, Action Time) -20 C +20 C +40 C Dispersion	Sample ACC-REJ 346 0 - 1 103 0 - 1 500 <u>1</u> 100 0 - 1 100 0 - 1 50 11 - 16 100 26 - 27 120 <u>1</u> 120 <u>1</u> 120 <u>1</u> 300 <u>1</u>	3.1 3.4.1.1 3.4.1.2 3.4.1.3 3.4.1.4.1 3.4.1.4.2 3.4.2, 3.4.3, 3.4.4	4.4.2, Table V 4.6.1 4.6.2 4.6.3 4.6.4, 4.6.5 4.6.6 4.6.7	
NOTES:	<u>1</u> Check for compliance with the requirement.				

Replaces 1570, 1 Feb 85, which may not be used

AMSMC Form 1570b, 1 Jul 89

TABLE II. First article inspection

CLASSIFICATION OF CHARACTERISTICS

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PARAGRAPH	TITLE	SHEET 2 OF 3		DRAWING NUMBER 12960929 NEXT HIGHER ASSEMBLY
		EXAMINATION OR TEST	CONFORMANCE CRITERIA	
	Cartridge, 7.62mm, M973, Short Range Training, Ball			
	M60 Function & Casualty	+20 C <u>2/</u> -20 C <u>2/</u> +40 C <u>2/</u>	Sample ACC-REJ 3000 Table IV 3000 Table IV 3000 Table IV	4.6.8
	Cyclic Rate		-- <u>1/</u>	4.6.9 <u>3/</u>
<p>NOTES:</p> <p><u>1/</u> Check for compliance with the requirement.</p> <p><u>2/</u> Divided equally among 3 weapons.</p> <p><u>3/</u> Conducted simultaneously with function and casualty.</p>				

TABLE II. First article inspection
CLASSIFICATION OF CHARACTERISTICS **MIL-C-71167(AR)**

PARAGRAPH	TITLE	SHEET 3 OF 3		DRAWING NUMBER 12960929 NEXT HIGHER ASSEMBLY
		EXAMINATION OR TEST	CONFORMANCE CRITERIA	
	Cartridge, 7.62mm, M973, Short Range Training, Ball		Sample ACC-REJ	
	Bullet Integrity		4/	4.6.8.1 3/
	Fouling	Cyclic Rate Test Accuracy Test 2/	-- 3300 1/ 1/	4.6.9 3/
	Trajectory		100 1/	4.6.29
NOTES:	<p>1/ Check for compliance with the requirement. 2/ Divided equally among 3 weapons. 3/ Conducted simultaneously with function and casualty. 4/ 100 rounds will be evaluated at each temperature (+20 C, -20 C, +40 C). The results of all 3 temperatures combined shall meet 300-4-5.</p>			

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4.5 Quality conformance inspection.

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

4.5.1.1 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 Inspections to be performed. Lot testing requirements, if necessary, for explosive materials unique to the cartridge shall be provided by the ARDEC Safety Office through the contracting agency prior to contract award.

4.5.3 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 level stated in Table V.

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TABLE III. Attributes sampling inspection.

<u>Lot Size</u>	<u>Inspection Levels</u>	
	<u>I</u>	<u>II</u>
2 to 8	*	*
9 to 15	*	8
16 to 25	*	8
26 to 50	*	8
51 to 90	50	8
91 to 150	50	12
151 to 280	50	19
281 to 500	50	21
501 to 1,200	75	27
1,201 to 3,200	116	35
3,201 to 10,000	116	38
10,001 to 35,000	135	46
35,001 to 150,000	170	56
150,001 to 500,000	200	64
500,001 and over	244	64

Numbers under inspection levels indicate sample size; 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 conformance provisions(s) herein. In case of dispute as to whether the contractor's proposed alternative(s) provides equivalent assurance, the provisions of this specification shall apply. All approved alternative provisions shall be specifically incorporated into the contractor's quality program or inspection system, as applicable.

**QUALITY CONFORMANCE INSPECTION
CLASSIFICATION OF CHARACTERISTICS**

MIL-C-71167(AR)

PARAGRAPH	TITLE	SHEET 1 OF 2		DRAWING NUMBER 12960929 NEXT HIGHER ASSEMBLY
		EXAMINATION OR TEST	CONFORMANCE CRITERIA	
4.5.3.1	Cartridge, 7.62mm, M973, Short Range Training, Ball			
		Sample ACC-REJ		
	Examination for Defects	---	3.1	4.5.3, Table V
	Primer Sensitivity	Major Class Minor Class	3.4.1.1	4.6.1
	Residual Stress		3.4.1.2	4.6.2
	Bullet Pull		3.4.1.3	4.6.3
	Waterproof		3.4.1.4	4.6.4, 4.6.5
	EPVAT (Electronic Chamber & Port Pressure, Velocity, Action Time)		3.4.2, 3.4.3, 3.4.4	4.6.6
	Dispersion		3.4.5	4.6.7

NOTES: 1L 2L 3L 4L 5L - See page 26.

QUALITY CONFORMANCE INSPECTION
CLASSIFICATION OF CHARACTERISTICS

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PARAGRAPH	TITLE	SHEET 2 OF 2	DRAWING NUMBER 12960929	NEXT HIGHER ASSEMBLY
CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
4.5.3.1	Cartridge, 7.62mm, M973, Short Range Training, Ball			
	Function & Casualty	Sample ACC-REJ 1000 Table IV 600 Table IV 600 Table IV	3.4.6	4.5.5, 4.6.8
	+20 C -20 C +40 C			
	Cyclic Rate	-- ZI	3.4.6.1	4.6.9 <u>8/</u>
	Bullet Integrity	<u>9/</u>		<u>8/</u>
NOTES: <u>8/</u> , <u>ZI</u> , <u>8/</u> , <u>9/</u> , - See pages 26 and 27.				

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4.5.3.1, Continued - Notes:

- 1/ Failure to comply with the applicable requirement shall be cause for rejection of the lot subject to testing of a second sample consisting of double the quantity used in the first test. Failure of the cartridges in the second sample to comply with the applicable requirement shall be cause for rejection of the lot.
- 2/ Failure of 2 or more cartridges to comply with the applicable requirement shall be cause for rejection of the lot. If one cartridge fails in the first test, a second sample consisting of double the number of cartridges in the first sample may be tested. If any failing cartridges are found in the second sample, the lot shall be rejected.
- 3/ Failure of 3 or more cartridges to comply with the applicable requirement shall be cause for rejection of the lot. If one or two cartridges fail in the first test, a second sample consisting of double the number of cartridges in the first sample shall be tested. The lot shall be rejected if in the combined first and second sample 3 or more cartridges fail to comply with the applicable requirement.
- 4/ Failure of 16 or more cartridges to comply with the bubble test requirement shall be cause for the rejection of the lot. If more than 11 but less than 16 cartridges fail in the first test, a second sample consisting of double the number of cartridges in the first sample shall be tested. The lot shall be rejected if in the combined first and second sample, 27 or more cartridges fail to comply with the bubble test requirement. The waterproof firing/velocity test (3.4.1.4.2, 4.6.5) may be substituted for the bubble test in the first test or the retest, using the same sample sizes.
- 5/ 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.
- 6/ Divided equally among 2 weapons.
- 7/ Check for compliance with the requirement.
- 8/ Conducted simultaneously with function and casualty.

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4.5.3.1, Continued - Notes:

9/ 100 rounds will be evaluated at each temperature (+20°C, -20°C, +40°C) in the M60 Machine Gun. In the combined results (300 rounds), failure of 5 or more cartridges to comply with the applicable requirements shall be cause for rejection of the lot. If more than 2 but less than 5 cartridges fail in the first test, a second sample consisting of double the number of cartridges in the first sample shall be evaluated. The lot shall be rejected if in the combined first and second sample, 5 or more cartridges fail to comply with the requirement.

4.5.4 Test samples. Only cartridges having met the visual and dimensional requirements shall be used in the ballistic tests, and shall have been selected in such a manner that the sample is representative of the entire lot. The cartridges shall be thoroughly mixed before being divided into samples for the various tests.

4.5.5 Function and casualty retest. The lot shall be rejected when function and casualty defects plus firing defects observed in all other firing tests exceeds the acceptance criteria of Table IV. A second sample, consisting of double the quantities specified under the function and casualty test, shall be fired. The retest quantity shall be fired in accordance with 4.6.8. 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 retested should occur to the extent that they exceed the acceptance criteria, the lot shall be rejected.

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TABLE IV. Firing defects.

Class	Criteria <u>1/</u>
Critical: 1. Bullet in bore 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. Uncontrolled fire (3 rounds or greater) <u>3/</u> 7. Other critical <u>4/</u>	None allowed.
Major: 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 (2 rounds or less) <u>5/</u> 106. Other major <u>6/</u>	Total majors allowed per 1000 rounds = 2.5
Minor: (Group A) 201. Split neck, shoulder or mouth (dwg. 7643674, locations I and S) 202. Gas leak through or around primer cup 203. Detached material (upon extraction) 204. Other minor <u>7/</u> Minor: (Group B) 205. Stoppage (attributable to ammunition)	Total Group A minors allowed per 1000 rounds = 10 Total Group B minors allowed per 1000 rounds = 10

See Page 30 for Notes.

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NOTES: (For Table IV)

- 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.
- 3/ Uncontrolled fire of 3 rounds or greater occurs when 3 or more rounds are fired in excess of that expected to be fired. For example, if in single shot mode, one trigger pull produces 4 or more rounds to fire, or in three round burst mode, one trigger pull causes 6 or more rounds to fire.
- 4/ Any other defect that is likely to result in hazardous or unsafe conditions.
- 5/ Uncontrolled fire of 2 rounds or less occurs when 1 or 2 rounds are fired in excess of that expected to be fired. For example, if in single shot mode, one trigger pull produces 2 or 3 rounds to fire, or if in three round burst mode, one trigger pull produces 4 or 5 rounds to fire.
- 6/ 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.
- 7/ Any other defect that is not likely to reduce materially the usability of the round or weapon for its intended purpose or is a departure from established standards having little bearing on the effective use or operation of the round.

TABLE V. Cartridge inspections
CLASSIFICATION OF CHARACTERISTICS **MIL-C-71167(AR)**

PARAGRAPH	TITLE	SHEET 1 OF 3		DRAWING NUMBER 12960929 NEXT HIGHER ASSEMBLY
		EXAMINATION OR TEST	REQUIREMENT PARAGRAPH	
CLASSIFICATION		CONFORMANCE CRITERIA		INSPECTION METHOD REFERENCE
	Cartridge, 7.62mm, M973, Short Range Training, Ball	<u>1</u>		
Critical:				
1.	Case split in K, L or M location (6)	100 %	3.1	Gage
2.	Case split in S or J location with loss of powder (6)	100 %	3.1	Gage
3.	Perforated case (7)	100 %	3.1	Gage
4.	Low charge <u>2</u>	100 %	3.1	Gage
5.	Other <u>3</u>	100 %	3.1	Gage
Special:				
a.	Primer missing (32)	100 %	3.1	Visual
b.	Primer cocked (33)	100 %	3.1	Visual
c.	Primer inverted (34)	100 %	3.1	Visual
Major:				
101.	Case split in S or J location with no loss of powder	100 %	3.1	Visual
102.	Corroded or stained (if etched) case (2)	Level I	3.1	Visual
103.	Round head (4)	Level I	3.1	Visual
104.	Dented case (5)	Level I	3.1	Visual
NOTES:	<u>1</u> Numbers after defect descriptions refer to visual standards in MIL-STD-636. <u>2</u> The contractor shall submit an analysis that establishes the minimum charge required to preclude the possibility of a bullet in bore. Cartridges containing less than this minimum charge are critically defective. <u>3</u> Any other defect which is likely to result in hazardous or unsafe conditions.			

TABLE V. Cartridge inspections
CLASSIFICATION OF CHARACTERISTICS **MIL-C-71167(AR)**

PARAGRAPH	TITLE	SHEET 2 OF 3		DRAWING NUMBER 12960929
		EXAMINATION OR TEST	REQUIREMENT PARAGRAPH	
CLASSIFICATION		CONFORMANCE CRITERIA	INSPECTION METHOD REFERENCE	
Major:				
105.	Draw scratch in case (8)	Level I	3.1	Visual
106.	Beveled underside of head (10)	Level I	3.1	Visual
107.	Scaly metal on case (12)	Level I	3.1	Visual
108.	No chamber on head (rim) (13)	Level I	3.1	Visual
109.	Loose primer (35)	Level I	3.1	Visual/Manual
110.	Diameter of extractor groove, max, incorrect	Level I	3.1	Gage
111.	Diameter of head, incorrect	Level I	3.1	Gage
112.	Thickness of rim, incorrect	Level I	3.1	Gage
113.	Length to shoulder datum, incorrect	Level I	3.1	Gage
114.	Depth of primer, incorrect	Level I	3.1	Gage
115.	Primer cup missing	Level I	3.1	Visual
116.	Overall length, max, incorrect	Level I	3.1	Gage
117.	Cartridge Identification Markings missing/incorrect	Level I	3.1	Visual
118.	Other 4/	Level I	3.1	Visual
<p>NOTES:</p> <p>1/ Numbers after defect descriptions refer to visual standards in MIL-STD-636.</p> <p>4/ Any other defect that is not critical but is likely to result in failure or to reduce materially the useability of the cartridge for its intended purpose.</p>				

TABLE V. Cartridge inspections
CLASSIFICATION OF CHARACTERISTICS **MIL-C-71167(AR)**

PARAGRAPH	TITLE	SHEET 3 OF 3		DRAWING NUMBER 12960929 NEXT HIGHER ASSEMBLY
		EXAMINATION OR TEST	REQUIREMENT PARAGRAPH	
CLASSIFICATION		CONFORMANCE CRITERIA	INSPECTION METHOD REFERENCE	
<u>Minor:</u>				
201.	Discolored, dirty, oily or smeared (waterproofing) (1)	Level II	3.1	Visual
202.	Dented case (5)	Level II	3.1	Visual
203.	Draw scratch in case (8)	Level II	3.1	Visual
204.	Scratch in case (9)	Level II	3.1	Visual
205.	Scaly metal on case (12)	Level II	3.1	Visual
206.	Fold, wrinkle, buckle or bulge in case (14, 15, 16, 17)	Level II	3.1	Visual
207.	Head stamp missing or illegible (18)	Level II	3.1	Visual
208.	Defective head (19)	Level II	3.1	Visual
209.	No waterproofing material (primer pocket joint) (37)	Level II	3.1	Visual
210.	Defective crimp (primer) (38)	Level II	3.1	Visual
211.	Diameter of extractor groove, min, incorrect	Level II	3.1	Gage
212.	Poor workmanship	Level II	3.1	Visual
213.	Other <u>5</u>			
NOTES:	<p><u>1</u> Numbers after defect descriptions refer to visual standards in MIL-STD-636. <u>5</u> Any other defect that is not major or critical but is a departure from established standards having little bearing on the effective use or operation of the cartridge.</p>			

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4.5.6 Packaging, packing and marking. Inspection for 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 cartridge shall be performed to ascertain that the cartridge type conforms to the drawing. All nonconforming cartridges shall be rejected.

4.5.7 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 6.2 herein.

4.6 Methods of inspection. All firings in the M60 Machine Gun shall be performed utilizing a bipod/tripod mount. Type AA, 40-pound Kraft, Type I, wrapping paper shall be utilized where witness screens are specified.

4.6.1 Primer sensitivity. Test in accordance with the SCATP-7, 62mm, Chapter 4, Section 1, and TECP700-700, Vol. III, Subsection 7-25, utilizing the ball and firing pin identified on drawings 10520006 and 10524139. The Complete Rundown Test shall be performed until such time the Government authorizes use of the 2- Height Test (with Complete Rundown Tests performed at some specified interval).

4.6.2 Residual stress.

4.6.2.1 Cartridges with brass cases. Test in accordance with SCATP-7.62, Chapter 1, Section 11. Prior to testing, all lubricants and coatings shall be removed from the cartridge case using solvents or cleaning techniques appropriate to the particular lubricant or coating being used.

4.6.2.2 Cartridges with polyethylene cases. Test in accordance with Appendix B.

4.6.2.3 Cartridges with steel cases. Testing not required.

4.6.2.4 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.

4.6.3 Bullet extraction. The cartridge shall be tested in a Government approved bullet extraction machine in accordance with SCATP-7.62, Chapter 7, Section 6. the rate of travel of the test machine head shall be from 75 to 150mm per minute.

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4.6.4 Waterproof. (Bubble test) Test in accordance with SCATP-7.62, Chapter 1, Section 19. If the cartridge fails the bubble test, the velocity/waterproof test may be used.

4.6.5 Velocity/waterproof. This test may be substituted for the bubble test. The cartridges shall be submerged in water at +20°C, for 24 hours, wiped dry, then placed in a temperature controlled room or chamber at $+20 \pm 2^\circ\text{C}$ for at least 2 hours. Fire the cartridges one shot at a time in a universal receiver, recording the velocity at 15 feet in accordance with SCATP-7.62, Chapter 1, Section 13. Failure to meet the requirement shall be grounds for rejection.

4.6.6 Chamber pressure, port pressure, velocity and action time. The test samples shall be conditioned at the test temperatures, $\pm 2^\circ\text{C}$ for at least two hours. The test shall be conducted in accordance with SCATP-7.62.

4.6.7 Dispersion. The test shall be conducted in accordance with SCATP-7.62, Chapter 1, Section 3, with the following amendments:

a. Equipment lists for dispersion testing can be found in ARDEC drawings 8654126 and 8649433.

b. Ten round targets shall be fired with the targets located 25 meters from the muzzle of the test barrel. The target shall be of a size applicable to the expected dispersion of the bullet holes.

4.6.8 Function and casualty. Function and casualty tests shall be conducted in accordance with SCATP-7.62 and the following:

4.6.8.1 Function and casualty acceptance criteria for qualification. 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 -55°C and $+68^\circ\text{C}$ shall be conducted with both ammunition and weapons conditioned at the test temperature. The acceptance criteria on Table IV, for all defect classes, shall be applied to the results of this testing.

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c. If acceptable performance in accordance with Table IV at -55°C and $+68^{\circ}\text{C}$ is achieved, the remainder of the function and casualty tests (-20°C , $+20^{\circ}\text{C}$, 40°C) 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 -55°C or $+68^{\circ}\text{C}$ 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 (F&C) testing at the less extreme temperatures (-20°C or $+40^{\circ}\text{C}$), with both weapon and ammunition conditioned at the test temperature. This shall be accomplished as follows:

(1) Failure at -55°C will require firing 1000 rounds at -20°C with both ammunition and weapon conditioned at the test temperature.

(2) Failure at $+68^{\circ}\text{C}$ will require firing 1000 rounds at $+50^{\circ}\text{C}$ with both ammunition and weapon conditioned at the test temperature.

(3) The 1000 rounds shall be divided equally among 2 weapons of the type that failed testing at either -55°C or $+68^{\circ}\text{C}$. 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 F&C testing with that weapon, at that temperature (6500 rounds), may be conducted with only the ammunition being temperature conditioned. These firings must also meet all the acceptance criteria of Table IV.

4.6.9 Cyclic rate. Cyclic rates shall be recorded during Function and Casualty testing.

4.6.10 Noise. Test in accordance with Appendix D.

4.6.11 Breech flash. During all Function and Casualty firings, the breech of the weapons shall be observed for breech flash. Any instance of breech flash shall be noted, as well as, the relative magnitude of each occurrence. The criteria shall be considered met if the number of breech flash defects meets the acceptable levels as called out in Table I. The observer shall classify all occurrences of breech flash as follows:

a. Critical - Any instance of breech flash that will cause hazardous or unsafe conditions for a shooter (right or left handed).

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b. Major - Any instance of flame in the breech area that is not critical.

c. Minor - Any instance of breech sparks which do not eject into the area of a shooter.

Failure to readily clear the gun shall be cause for rejection. If 120 rounds cannot be fired in 2 minutes, the weapon shall be cooled, and the test shall be repeated.

4.6.12 Hot chamber effects. Using an M60 Machine gun fire 200 rounds in 40-round bursts as quickly as possible. The last round shall be chambered but not fired. The maximum time allowed for the firing of 120 rounds shall be 2 minutes. If the round fires (cooks-off), the time shall be recorded. After 25 minutes, the weapon shall be cleared by either manually ejecting or firing the cartridge.

4.6.13 Chemical compatibility. Test in accordance with Appendix C.

4.6.14 Bullet integrity. Observe for bullet integrity during function and casualty. As part of the Function and Casualty firings, a quantity of rounds (as specified in Tables I, II, and 4.5.3.1) shall be evaluated in accordance with the following procedure. A paper sheet (6' x 6' minimum) shall be stretched tightly over a rigid frame of the same size. The sheet shall be placed perpendicular to the barrel of the weapon, 15 feet from the muzzle. The sheet shall be replaced as necessary to facilitate observation. Any evidence of bullet fragmentation indicated by irregular perforations or by the number of perforations exceeding the number of rounds fired shall be noted. All irregular perforations shall be measured. All irregular perforations greater than 1/10 inch shall be classed as defects.

4.6.15 Fouling. The entirety of the fouling test shall be conducted at ambient (+20°C) temperature. A portion of part a. of the test may be conducted as part of the Function and Casualty testing at +20°C. The following procedure shall be used:

a. In each weapon, fire 1000 rounds and record the cyclic rate of the initial 90 rounds and the final 90 rounds fired. The firing shall be conducted in accordance with SCATP-7.62.

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b. After firing the 1000 rounds for part a. above, 100 rounds (10 - 10 round targets) shall be fired for accuracy in each of the M60 Machine Gun used in part a. The weapons shall be secured in rigid test mounts and the target shall be 100 meters from the muzzle of the weapons. The test shall be fired one shot at a time and in accordance with SCATP-7.62, Section 3. The weapons shall not be cleaned prior to this portion of the test.

c. Cleaning or lubrication of the barrel or any part of the weapon is only permitted in between 1000-round segments, after observation for fouling has been made. Should stoppages or malfunctions occur at a rate greater than that allowed by Table IV, the weapon shall be examined for evidence of propellant fouling or particle/shavings fouling as a possible cause. The results of the examination shall be noted.

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

4.6.16 Target kill. The test is to be conducted using one M60 Machine Gun, four target types (polyethylene "E", polyethylene "F", cardboard "E" and cardboard "F") and two target supports (M31A1 target mechanism, and any suitable Government approved stationary target support). Targets shall be placed 100 meters from the muzzle of the weapons. Twenty rounds shall be fired using each possible weapon, target type, target support combination (for a total of 160 rounds). Cartridges shall be fired single shot from M60 Machine Gun. Observers should be present down range to determine if fired projectiles actually strike the targets. If it is determined that a shot missed the target, a non-penalty replacement shot shall be fired. The results of each shot regarding the activation of the mechanism and the impact on the target shall be recorded as follows:

M - Marked target	A - Activated Mechanism
P - Penetrated target	NH - No Hit (missed target)
NM - No Mark	NA - No Mechanism Activation

Equipment List:

M31A1 - Trainfire Target Holding Mechanism	Dwg. 8421679
"E" Cardboard Silhouette Target	Dwg. 6006874
"F" Cardboard Silhouette Target	Dwg. 6109086
"E" Polyethylene Silhouette Target	Dwg. 12002898
"F" Polyethylene Silhouette Target	Dwg. 12002899

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The criteria will be considered met if both:

a. All targets held by stationary supports are either marked or penetrated by every shot.

b. The target mechanism is activated by every round that strikes a target supported by the target mechanism.

4.6.17 Attitude. The M60 Machine Gun shall be fired from a mount which allows the elevation to vary from -85° to $+85^{\circ}$. The test shall be conducted with one weapon of each type. In each weapon, 150 rounds shall be fired at each of 3 weapon altitudes ($+85^{\circ}$, 0° , -85°) and the firings shall take place as follows:

M60 Firing Schedule

30 Rounds	Full Auto
30 Rounds	Full Auto
30 Rounds	Single Shot
30 Rounds	Short Bursts
30 Rounds	Full Auto

150 Rounds

All fired cases shall be inspected, and all weapon stoppages shall be recorded. The criteria shall be considered met if:

a. No critical defects occur upon firing.

b. The reliability at either $+85^{\circ}$ or -85° does not degrade by more than 0.10 from the reliability at 0° for both weapons.

4.6.18 Maximum range. The maximum range test will be conducted with test ammunition conditioned at the temperature which has yielded the greatest average muzzle velocity as determined in the velocity section of the Qualification test. The test shall be performed with the M60 Machine Gun using a bipod or tripod. The test shall be conducted in a location where the impact area is a clean flat surface such that projectile ground impacts can be readily seen, such as an airfield runway or a flat sand or dirt covered area. There should be a protected shelter down range where observers will be able to witness ground impacts. The test shall not be conducted when the wind velocity is greater than 5 mph in any direction.

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4.6.18.1 The test shall be conducted at quadrant elevations from 0 to 45 degrees above the horizontal. Fifteen shots shall be fired, in fifteen-round bursts, at each 5-degree increment from 0 to 45 degrees. After each burst, observers down range will note where the projectiles impact the ground, and will measure and record the distance to the muzzle of the weapon. Each 15-round burst shall be considered valid if a minimum of 12 rounds are discovered. If less than 12 rounds are found, that 15-round burst shall be repeated. A determination shall then be made as to what 10-degree elevation band is most likely to provide the maximum range. Once this band has been identified, 30-round bursts shall be fired at each 1-degree increment within that band. After each burst, the observer(s) shall locate the bullets and shall measure the distance from the impact location to the muzzle of the weapon. For each 30-round burst fired, the results shall be considered valid if a minimum of 25 projectiles are found. If less than 25 are found, that 30-round burst shall be repeated. The mean distance plus 3 standard deviations shall be calculated for each 30 round shot group, at each 1-degree increment. The greatest of these mean distances plus 3 standard deviations is the maximum range for the sample cartridge.

4.6.18.2 For each of the 30 rounds fired at the angle which gives the maximum range, the distance from the ground impact location to the line of fire in a perpendicular direction shall be measured. Each shot must fall within a fan of safety defined as the area bounded by two lines, 5° to the left and 5° to the right of the line of fire.

4.6.19 Sand and dust. The procedures outlined in TOP 3-2-045, Type A, shall be followed. The sand and dust mixture 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. One lubricated M60 shall be placed in a mount inside the dust chamber, along with the required ammunition. The dust dispenser shall be turned on and allowed to operate for one minute before firing. The function and casualty firing schedule for 500 rounds shall be followed. The cyclic rate measurements shall not be recorded, they are not required in this test. All fired cases shall be inspected for defects. The criteria shall be considered met if there are no critical defects in accordance with Table IV.

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4.6.20 Corrosion. The sample shall be subjected to the salt-fog test outlined in Method 509 of MIL-STD-810. After 48 hours of exposure to the 5% mixture, the sample shall be examined and its condition documented. It shall then be loaded into magazines. The rounds shall then be chambered and fired in the specified weapons. Failure of the rounds to safely function (critical defects in accordance with Table IV) shall be cause for rejection.

4.6.21 Temperature/humidity cycling. The temperature/-humidity cycling test shall be conducted as follows:

a. One half of the sample shall be subjected to the schedule below for a period of four days.

<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

b. Following the conditioning 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 shall be repeated with the unconditioned cartridges in the exact same weapon.

c. For each weapon type, the average cyclic rate obtained with conditioned cartridges shall be statistically compared to the average cyclic rate obtained with unconditioned cartridges. The cyclic rates and their difference shall be recorded.

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

4.6.22 Long term high temperature storage. The long term high temperature storage test shall be conducted as follows:

a. One half the sample shall be subjected to continuous heating at +40°C (+104°F) and 15% relative humidity for 120 days.

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b. Following the conditioning 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 shall be repeated with the unconditioned cartridges in the same exact weapon.

c. For each weapon type, the average cyclic rate obtained with conditioned cartridges shall be statistically compared to the average cyclic rate obtained with unconditioned cartridges. The cyclic rates and their difference shall be recorded.

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

4.6.23 Long term low temperature storage. The long term low temperature storage test shall be conducted as follows:

a. One half the sample shall be subjected to continuous cooling at -20°C for 30 days.

b. Following the conditioning period, the conditioned cartridges shall be fired in accordance with the function and casualty firing schedule for 500 rounds with the cyclic rate recorded as indicated. The same shall be repeated with the unconditioned cartridges in the exact same weapon.

c. For each weapon type, the average cyclic rate obtained with conditioned cartridges shall be statistically compared to the average cyclic rate obtained with unconditioned cartridges. The cyclic rates and their difference shall be recorded.

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

4.6.24 Sequential rough handling. This test shall be performed after the secure cargo test (4.6.28) utilizing the same cartridges and packaging. One wire-bound box (2000 rounds) shall be conditioned at a temperature of $160 \pm 5^{\circ}\text{F}$ and the second box shall be conditioned at $-65 \pm 5^{\circ}\text{F}$. After conditioning for a minimum of 16 hours, both boxes shall be subjected to the following tests in the order specified:

a. Three-foot drop test in accordance with paragraph 6.4 of MIL-STD-1904.

b. Loose cargo test in accordance with paragraph 6.13 of MIL-STD-1904 (two planes).

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c. Seven-foot drop test in accordance with paragraph 6.4 of MIL-STD-1904, with the exception that each box shall be dropped twice, once on the bottom and once on the box side.

d. At the conclusion of the testing, failure of the containers to comply with the criteria specified in paragraph 7.4 of MIL-STD-1904 shall be cause for rejection. The containers shall be unpacked and the cartridges visually examined for damage. Failure of the cartridges to comply with the criteria specified in paragraph 7.3 of MIL-STD-1904 shall be cause for rejection. All damage to containers and cartridges shall be recorded. A random sample of 150 cartridges shall be selected from each of the two wire-bound boxes (300 rounds total). A sample of 50 cartridges from the 300-round sample shall be subjected to the following 5-foot drop test.

e. Each of the fifty rounds shall be dropped twice on the same surface utilized in the 7-foot drop test from a height of 5 feet \pm 3 inches in the orientations specified below:

Drop Orientation

<u>Round No.</u>	<u>Drop No. 1</u>	<u>Drop No. 2</u>
1 & 2	Horizontal	Horizontal
3 & 4	Horizontal	Base down
5 & 6	Horizontal	Nose down
7 & 8	Horizontal	45°, base down
9 & 10	Horizontal	45°, nose down
11 & 12	Base down	Horizontal
13 & 14	Base down	Base down
15 & 16	Base down	Nose down
17 & 18	Base down	45°, base down
19 & 20	Base down	45°, nose down
21 & 22	Nose down	Horizontal
23 & 24	Nose down	Base down
25 & 26	Nose down	Nose down
27 & 28	Nose down	45°, base down
29 & 30	Nose down	45°, nose down
31 & 32	45°, base down	Horizontal
33 & 34	45°, base down	Base down

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Drop Orientation

<u>Round No.</u>	<u>Drop No. 1</u>	<u>Drop No. 2</u>
35 & 36	45°, base down	Nose down
37 & 38	45°, base down	45°, base down
39 & 40	45°, base down	45°, nose down
41 & 42	45°, nose down	Horizontal
43 & 44	45°, nose down	Base down
45 & 46	45°, base down	Nose down
47 & 48	45°, base down	45°, base down
49 & 50	45°, base down	45°, nose down

f. At the conclusion of the drop testing, the 50-round sample shall be combined with the remaining 250 rounds of the original sample and shall be fired at ambient temperature in accordance with the procedures for function and casualty testing specified in 4.5.7. The reliability (total number of defects/total number of rounds fired) demonstrated in this test shall be no more than 10 percent below the reliability demonstrated during the initial ambient temperature function and casualty test. The remaining metal container from each box shall be repacked and combined into one wire-bound box (the one in best condition) and shall be subjected to a 40-foot drop test at ambient temperature in accordance with paragraph 6.12 of MIL-STD-1904. Following this test the cartridges shall be safe to handle and dispose of as specified in 3.5.5. The container need not be functional. The test results shall be documented in accordance with paragraph 5.3 of MIL-STD-1904 and be supplemented with photographs documenting the procedures and damages. The sequential rough handling test shall be performed by the Government.

4.6.25 Toxic fumes. The M60 Machine Gun shall be placed inside a closed chamber with the muzzle through an orifice on one side. The chamber shall be a cube, 2.13 meters on a side (9.67 cubic meters). Fire five trials of 30 rounds each, in each weapon, in short bursts. Draw air samples continuously to monitor for carbon monoxide, ammonia, nitrogen dioxide and sulfur dioxide. Repeat the test using 7.62mm, Ball M80 Cartridges for reference.

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4.6.26 Safety hazard classification. The Final Hazard Classification tests shall be conducted by the contractor at his expense. The Final Hazard Classification tests shall be conducted in accordance with TB 700-2. The tests to be conducted are three single package tests and one external fire stack test. The external fire stack test shall use five outer packing units. The Government (ARDEC System Safety Office) reserves the right to observe all Final Hazard Classification tests. ARDEC System Safety Office must be notified two weeks prior to any Final Hazard Classification testing. The Final Hazard Classification test report containing the test data shall be submitted to ARDEC System Safety Office eight months prior to production quantity shipments and should include the following:

- a. Test data report will include the following:
 - Nomenclature and top drawing of the item
 - Packaging description of the item and packaging drawings
 - Test Data in accordance with TB 700-2
 - Photographs before and after the test
 - Other test data as required for Final Explosive Hazard Classification Data submission by a contractor. See paragraph 6.7 for this data requirement.
- b. Video tapes during hazard classification tests.

4.6.27 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 follows:

<u>Test</u>	<u>Test Document</u>	<u>Test Procedure/ Paragraph or Description</u>
a. Friction Test - Apparatus and comparison values	MIL-STD-1751	5.4.8 or 5.5.3
b. Impact Test - Apparatus and comparison values	MIL-STD-1751 TB 700-2	5.2.2, 5.4.2 or 5.5.1 5.2.i
c. Electrostatic discharge test - Apparatus and comparison values	MIL-STD-1751	5.2.3, 5.4.7 or 5.5.4

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<u>Test</u>	<u>Test Document</u>	<u>Test Procedure/ Paragraph or Description</u>
d. Auto ignition temperature	MIL-STD-1751	5.3.9
e. Explosive temperature (5 sec)	MIL-STD-650	506
f. Detonation test	TB 700-2	5.2.f
g. Ignition and unconfined burning test	TB 700-2	5.2.g
h. Thermal stability test	TB 700-2	5.2.h
i. Card gap test	TB 700-2	5.2.j
j. Explosibility of dusts	BOM Rpt 5624 Page 12	Minimum Explosive Concentration

These test results should be submitted to the ARDEC system Safety Office (see 6.12).

Reference: Bureau of Mines Report 5624 - Laboratory Equipment and Test Procedures for Evaluating Explosibility of Dusts.

4.6.28 Secure cargo (transportation/vibration). Two wire-bound boxes (4000 rounds total) shall be subjected to the secured, nontactical vibration test as specified in paragraph 6.3.1 of MIL-STD-1904. Testing shall be performed at ambient temperature only. Following testing, failure of the containers to comply with the criteria specified in paragraph 7.4 of MIL-STD-1904 shall be cause for rejection. The containers shall be unpacked and the cartridges visually examined for damage. Failure of the cartridges to comply with the criteria specified in paragraph 7.3 of MIL-STD-1904 shall be cause for rejection. All damage to containers and cartridges shall be recorded. The cartridges shall be repacked and subjected to the sequential rough handling test (4.6.24). The secure cargo test shall be performed by the Government.

4.6.29 Trajectory. The contractor shall submit 100 rounds of M973 cartridges to the Government for trajectory testing (see 6.10).

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5. PACKAGING

5.1 Level A. The cartridge shall be packed in accordance with drawings 9362607, 7553708, 8593306, 8597306, 10521861, or 10535780 as appropriate.

5.1.1 Marking. Markings shall be in accordance with drawings 9362607, 7553708, 8593306, 8597306, 10521861 or 10535781 as appropriate.

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 design of the package shall use military or federal specifications as much as possible and shall meet the requirements of Method 1A of MIL-P-116 and the Code of Federal Regulations, Title 49, Section 173.101. The contractor shall submit the packaging design 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.

5.2.1 Unit package. 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 test listed in 5.2.3. The quantity of 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.

5.2.3 Tests. In order to ensure 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°F, +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

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(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 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 A1, A2 and A3 in Appendix A) on three mutually perpendicular axes, 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 14 and test 13, the packaged ammunition should be safe to handle and operable. The decision that the ammunition has 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.

5.2.3.3.2 Explosive elements. At the conclusion of test 12, no explosive element should have burned or detonated and ammunition should be safe to dispose of by applicable handling and disposal regulations without injury to personnel.

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

5.4 Marking. The boxes shall be marked per MIL-STD-129 and Code of Federal Regulations title 49, Section 173.101 and United Nations - Transport of Dangerous Goods, Section 9.

5.5 Unitization. All ammunition must be unitized for shipment and storage. Packaging drawings shall be submitted to ARDEC for transmittal to the U.S. Army Defense Ammunition Center and School which will provide approved unitization drawings and procedures.

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6. NOTES

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

6.1 Intended use. This cartridge is intended for use in the M16 series rifles for training.

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 2.1.1 and 2.2).
- c. Requirements for submission of first article sample.
- d. Type and level of packing of this specification.
- e. Provision for submission of Inspection Equipment Designs (DI-R-1714).
- f. Provisions for submission of acceptance inspection results for each lot of ammunition presented to the Government (see 6.6).

6.3 Submission of contractor inspection equipment designs for approval. Submit copies of designs as required to: Commander, U.S. Army ARDEC, ATTN: SMCAR-QAF-I, Picatinny Arsenal, NJ 07806-5000. Request letter of submittal should state contractor, contract number, specification number, item nomenclature, and classification of defects and tests paragraph number. This address will be specified on the Contract Data Requirements List, DD Form 1423 in the contract.

6.4 Data cards. (see MIL-A-48078) Distribution of data cards shall include the following: Commander, U.S. Army Armament Research, Development and Engineering Center, ATTN: SMCAR-QAF-S, Picatinny Arsenal, NJ 07806-5000.

6.5 Drawings. Drawings listed in Section 2 of this specification under the heading U.S. Army Armament, Research, Development and Engineering Center (ARDEC) may also include drawings prepared by, and identified as U.S. Army Armament, Research and

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Development Command (ARRADCOM), Frankford Arsenal, Rock Island Arsenal or Picatinny Arsenal drawings. Technical data originally prepared by these activities is now under cognizance of ARDEC.

6.6 Data submission. Results of all tests performed by the contractor shall be submitted in accordance with Data Item DI-QCIC-80736 on the DD Form 1423 for the contract. Distribution shall include the address specified in 6.3.

6.7 Data items. Data required by this specification are cited in the paragraphs listed below. The Form DD1423 should include distribution of data cards as specified in 6.3.

<u>Paragraph</u>	<u>Data Requirement</u>	<u>Applicable DID</u>
4.5	Quality Inspection, Quality Deficiency Report	DI-QCIC-80736
4.6.26	Final Hazard Classifi- cation Data	As per contract

6.8 Definitions.

6.8.1 Interfix. A commodity made to one unchanged design which encompasses unchanged drawing(s), material(s) and specification(s), manufactured by a specific manufacturing process by a single manufacturer at a single location.

6.8.2 Reliability. For the purpose of this specification, the following measure of reliability shall be used.

$$\text{reliability} = 1 - \frac{\text{number of stoppages (ammunition related)}}{\text{number of rounds fired}}$$

6.9 Submission of alternative quality conformance provisions. All contractor proposed alternative quality conformance provisions will be submitted to the Government for evaluation/approval as directed by the contracting activity.

6.10 Trajectory samples. Sample cartridges for trajectory testing shall be submitted to Commander, U.S. Army ARDEC, ATTN: SMCAR-CCL-SD, Picatinny Arsenal, New Jersey 07806-5000.

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6.11 Subject term (key word) listing.

Bullet
Function and Casualty
Small Arms
Testing

6.12 Submission of explosive sensitivity test results (see 4.6.27). Submit explosive sensitivity test results to: Commander, U.S. Army ARDEC, ATTN: SMCAR-QAS, Picatinny Arsenal, NJ 07806-5000. This address shall be specified on the Contract Data Requirement List, DD Form 1423 in the contract.

Custodian:
Army-AR

Preparing activity:
Army-AR

(Project 1305-AE55)

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APPENDIX A

PACKAGING TESTS

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 1, 2, and 3.

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APPENDIX AFigures for packaging tests

Vertical Axis*		Transverse Axis*		Longitudinal Axis*	
Freq.	PSD Value**	Freq.	PSD Value**	Freq.	PSD Value**
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			353	.0247
				379	.0085
				431	.0224
				433	.0092
				500	.0014

* TEST DURATION 120 MINUTES PER AXIS

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

FIGURE A1. Random vibration schedule-wheeled vehicle.

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FIGURE A2. Narrowband random-on-random vibration - tracked vehicle.

5-500 HZ Test Threshold No. Phase (g ² /Hz) Sweeps	NARROWBAND 1			NARROWBAND 2			NARROWBAND 3			NARROWBAND 4			NARROWBAND 5		
	BW (Hz)	PSD (g/Hz)	Sweep BW (Hz)	BW (Hz)	PSD (g/Hz)	Sweep BW (Hz)	BW (Hz)	PSD (g/Hz)	Sweep BW (Hz)	BW (Hz)	PSD (g/Hz)	Sweep BW (Hz)	BW (Hz)	PSD (g/Hz)	Sweep BW (Hz)
V1	0.0030	0.0649	3	60-70	0.0300	6	90-105	0.0236	9	120-140	0.0097	12	150-175	0.0128	15
V2	0.0018	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	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	0.1029	9	142-176	0.0698	18	213-264	0.0647	27	284-352	0.0280	36	335-440	0.0058	45
V5	0.0050	0.2065	9	188-224	0.5690	18	282-336	0.0583	27	376-448	0.0169	36	---	---	---
VERTICAL AXIS (12 minutes per test phase)															
T1	0.0015	0.0163	3	60-70	0.0222	6	90-105	0.0122	9	120-140	0.0054	12	150-175	0.0037	15
T2	0.0012	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	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	0.0535	9	142-176	0.1096	18	213-264	0.0358	27	284-352	0.0072	36	---	---	---
T5	0.0024	0.2093	9	188-224	0.1296	18	282-336	0.0267	27	376-448	0.0094	36	---	---	---
TRANSVERSE AXIS (12 minutes per test phase)															
L1	0.0023	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	0.0074	3	82-94	0.0115	6	---	---	---	---	---	---	---	---	---
L3	0.0038	0.0414	6	106-130	0.0227	12	159-195	0.0131	18	212-260	0.0165	24	265-325	0.0151	30
L4	0.0028	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	0.0985	9	188-224	0.1112	18	282-336	0.0431	27	376-448	0.0154	36	---	---	---
LONGITUDINAL AXIS (12 minutes per test phase)															

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APPENDIX A

Figures For Packaging Tests

Vertical Axis*		Transverse Axis*		Longitudinal Axis*	
Freq.	PSD Value**	Freq.	PSD Value**	Freq.	PSD Value**
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 96 MINUTES PER AXIS

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

FIGURE A3. Random vibration schedule-two-wheeled trailer.

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APPENDIX B

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 used in this test shall be approved by the Government prior to testing.

40.2 Material. Detergent, Nonylphenoxy Poly, (Ethyleneoxy) Ethanol is required for this test.

40.3 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.

40.4 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 procedure shall be followed:

a. Immerse the test samples in the detergent. Seal the detergent coated samples in a polyethylene bag to minimize evaporation and place them in an aluminum tray. Place the tray with the sealed bags of test samples in an oven set at 160°F ± 5°F for seven days.

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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 from the surfaces.

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

60.0 RECORDING OF 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 C

Chemical Compatibility Test Procedure

10.0 SCOPE

10.1 Scope. This appendix gives test procedures for performing the Chemical Compatibility Test.

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 6.2) prior to testing.

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

40.3 Lubricants. The lubricants, solvents and chemicals to be used are as indicated in Section 3.

50.0 TEST PROCEDURES

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

- a. The weapon shall be assembled in the test fixture.
- b. One thousand cartridges shall be divided equally among the required chemicals. the cartridges shall be immersed in the 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.

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c. After the 24-hour dripping period, the cartridges shall be wiped of the assigned chemical, and inspected for abnormalities.

50.2 Firing. The following procedure shall be followed:

a. 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 of control ammunition (unexposed to the chemicals) shall be fired in short bursts. The weapon shall be cleaned and 100 rounds of ammunition from the first test condition shall then be 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 functioning problems are encountered with any of the test conditions, the weapon shall 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.

50.3 Criteria. The criteria will be considered met if no critical defects are observed, and if the Reliability (see 6.7.2) of the test cartridges does not degrade by more than 0.10 from the control firings for each individual test chemical.

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. Machine gun type and serial number
- f. Number of shots through gun
- g. Machine gun headspace
- h. Firing pin protrusion
- i. Firing pin indent

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- j. Number of cartridges fired
- k. Case casualties
- l. Ammunition related stoppages
- m. Any abnormality
- n. Test personnel

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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 6.2) prior to testing.

40.2 Weapons. Weapons 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 $70 \pm 2^\circ\text{F}$ for a minimum of four 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.

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

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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, the weapon bolt is replaced with an M2 training bolt. The magazines containing the test cartridges shall be loaded into the weapon and fired.
- 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

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- h. Number of times the barrel has been fired
- i. Gun headspace
- j. Firing pin protrusion
- k. Firing pin indent
- l. Case casualties
- m. Any abnormality
- 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.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

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I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-C-71167 (AR)	2. DOCUMENT DATE (YYMMDD) 930923
3. DOCUMENT TITLE CARTRIDGE, 7.62MM, M973 BALL - SHORT RANGE TRAINING AMMUNITION		
4. NATURE OF CHANGE <i>(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets if needed.)</i>		
5. REASON FOR RECOMMENDATION		
6. SUBMITTER		
a. NAME <i>(Last, First, Middle initial)</i>	b. ORGANIZATION	
c. ADDRESS <i>(include Zip Code)</i>	d. TELEPHONE <i>(include Area Code)</i> (1) Commercial (2) AUTOVON <i>(if applicable)</i>	e. DATE SUBMITTED <i>(YYMMDD)</i>
8. PREPARING ACTIVITY		
a. NAME U.S ARMY ARDEC STANDARDIZATION OFFICE	b. TELEPHONE <i>(Include Area Code)</i> (1) Commercial 201-724-6675 (2) AUTOVON DSN-880-6675	
c. ADDRESS <i>(Include Zip Code)</i> ATTN: SMACA-BAC-S PICATINNY ARSENAL, NJ 07806-5000	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	