

INCH-POUND

MIL-PRF-32300(AR)

28 July 2008

## PERFORMANCE SPECIFICATION

## CARTRIDGE, 12 GAGE SHOTGUN: BREACHING – M1030

This specification is approved for use by the U.S. Army Armament Research, Development and Engineering Center (ARDEC), and is available for use by all Departments and Agencies of the Department of Defense.

## 1. SCOPE

1.1 Scope. This specification identifies the performance requirements and verification provisions for the CARTRIDGE, 12 GAGE SHOTGUN: breaching, M1030 for one-shot breaching of solid wood doors (see 6.1).

1.2 Army-type designator. The Army-type designator M1030 referenced in this specification is of Army origin and does not reflect a particular design (See 6.6).

## 2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 or 4 of this specification. This section does not include documents in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents

2.2.1 Specifications, standards, and handbooks. The following specifications, standards and handbooks form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract. (see 6.2).

Comments, suggestions, or questions on this document should be addressed to: Commander, U.S. Army ARDEC, ATTN: AMSRD-AAR-QES-E, Picatinny, New Jersey 07806-5000 or e-mailed to [ardecstdzn@conus.army.mil](mailto:ardecstdzn@conus.army.mil). Since contact information can change, you may want to verify the currency of this information using ASSIST Online database at <http://assist.daps.dla.mil>.

AMSC N/A

FSC 1305

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## INTERNATIONAL STANDARDIZATION AGREEMENT

STANAG 4556 EXPLOSIVES: VACUUM STABILITY TESTS

## FEDERAL STANDARDS

FED-STD-595/30117 Colors Used in Government Procurement/Lusterless Brown

FED-STD-595/37722 Colors Used in Government Procurement/Lusterless Silver

FED-STD-595/37875 Colors Used in Government Procurement/Lusterless White

## DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-372 Cleaning Compound, Solvent (For Bore of Small Arms and Automatic Aircraft Weapons)

MIL-PRF-680 Degreasing Solvent

MIL-DTL-12468 Decontaminating Agent, STB

MIL-PRF-14107 Lubricating Oil, Weapons, Low Temperature

MIL-L-46000 Lubricant, Semi-Fluid (Automatic Weapons)

MIL-PRF-63460 Lubricant, Cleaner and Preservative for Weapons and Weapon Systems

## DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-286 Propellants, Solid: Sampling, Examination & Testing

MIL-STD-636 Visual Standards for Small Arms Ammunition through Caliber .50

MIL-STD-650 Explosive: Sampling, Inspection and Testing

MIL-STD-810 Environmental Engineering Considerations and Laboratory Tests

MIL-STD-1168 Ammunition Lot Numbering and Ammunition Data Card

MIL-STD-1474 Noise Limits

MIL-STD-1916 DOD Preferred Methods for Acceptance of Products

(These documents are available online at <http://assist.daps.dla.mil> or from the Standardization Document Order Desk, 700 Robbins Avenue, Bldg. 4D, Philadelphia, PA 19111-5094)

2.2.2 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 of these documents are those cited in the solicitation or contract.

## DEPARTMENT OF DEFENSE TECHNICAL BULLETIN

TB 700-2 Department of Defense Explosives Hazard Classification Procedures

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(This document is available online at [https://www3.dac.army.mil/es/documents/TB700\\_2.pdf](https://www3.dac.army.mil/es/documents/TB700_2.pdf), or from the Chairman, Department of Defense Explosives Safety Board, Room 856C, Hoffman Building 1, 2461 Eisenhower Avenue, Alexandria, VA 22331-0600.)

## ARDEC DRAWINGS

7553296	Box, Ammunition, M2A1 Assembly
7553347	Box, Wirebound, M2A1
9292851	Cartridge, 12 Gauge (for primer sensitivity test)
9396197	Packing and marking for M2A1 ammo box for cartridges, Shotshell
9396206	Packing and marking for wirebound box assembly for cartridges, Small caliber
12982865	Minimum marking instructions for ammunition and explosive containers
12990872	Cartridge, 12 Gauge Breaching M1030

(Copies of these drawings are available from US Army ARDEC, AMSDR-AAR-AIS-TD, Picatinny, NJ 07806-500, or online from [pica.Drawing.Request@conus.army.mil](mailto:pica.Drawing.Request@conus.army.mil).)

## ARDEC PUBLICATIONS

TECP 700-700	Manual of Test Methods For Small Arms Ammunition
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(Request copies from: Quality Engineering and System Assurance, U.S. Army, ARDEC, Picatinny, NJ 07806-5000, ATTN: AMSRD-AAR-QEM-D or online from [QESA-QEM-D@conus.army.mil](mailto:QESA-QEM-D@conus.army.mil))

## NAVAL SURFACE WARFARE CENTER INSTRUCTIONS

NAV SEA INST 8020.5C	Variation in Properties with Age
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(Request copies from: Commander Indian Head Division, Naval Surface Warfare Center 101 Strauss Avenue Code 660, Indian Head, MD 20640-5035, or contact [john.deiter@navy.mil](mailto:john.deiter@navy.mil))

## US ARMY DEVELOPMENTAL TEST COMMAND (DTC)

## INTERNATIONAL TEST OPERATING PROCEDURES

ITOP 4-2-601	Drop tests for munitions
ITOP 4-2-602	Rough handling test

## TEST OPERATING PROCEDURES

TOP 1-2-608	Sound level measurements
TOP 3-2-045	Automatic weapons, machine guns, and hand and shoulder weapons

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TOP 3-2-609	Chemical compatibility of nonmetallic materials in small arms systems
TOP 4-2-016	Ammunition, small arms

(These documents may be ordered from the US Army Developmental Test Command, ATTN: Publications, 314 Longs Corner Road, Aberdeen Proving Ground, MD 21005-5005, or online at <http://www.dtc.army.mil/publications/topsindex.aspx>.)

## BUREAU OF MINES REPORT (BOM)

Bureau of Mines Report of Investigations 5624	Laboratory Equipment and Test Procedures for Evaluating Explosibility of Dusts
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(This BOM Report may be ordered from <http://outside.cdc.gov:8000/ciss/newusers.html>, or from NIOSH, Pittsburgh Library, Cochran's Mill Road, P.O. Box 18070, Pittsburgh, PA 15236)

## US ENVIRONMENTAL PROTECTION AGENCY

EPA-745-R-99-004	EPA 33/50 Program - The final record
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(Copies of the above publication are available from <http://www.epa.gov> or United States Environmental Protection Agency, (7408), Washington, DC 20460)

## CODE OF FEDERAL REGULATIONS

Title 49	Transportation, Parts 100-185
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(The Code of Federal Regulations is available from the Superintendent of Documents, U.S. Government Printing Office, Washington D.C. 20402. Orders should specify, "49 CFR 100-185)."

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract (see 6.2).

## SPORTING ARMS & AMMUNITION MANUFACTURER'S INSTITUTE (SAAMI)

ANSI/SAAMI Z299.2	Voluntary Industry Performance Standards for Pressure and Velocity of Shotgun Ammunition for the use of Commercial Manufacturers.
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(Copies of SAAMI manuals are available from Secretary, Sporting Arms & Ammunition Manufacturer's Institute, PO Box 838, Branford, CT 06405, <http://www.saami.org>.)

## BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

ANSI/BHMA A156.2	Bored and Preassembled Locks and Latches
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(Copies of this manual are available from Builders Hardware Manufacturers Association, 335 Lexington Avenue, 15<sup>th</sup> Floor, New York, NY 10017, or online at <http://www.buildershardware.com>.)

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1141	Standard Practice For The Preparation of Substitute Ocean Water
ASTM F 476	Standard Test Methods for Security of Swing Door Assemblies

(Copies of ASTM International Standards are available from ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, <http://www.astm.org>)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, 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 Design verification. When specified (see 6.2), a sample of the cartridge and components shall be subjected to design verification in accordance with 4.2.

3.1.1 Product uniformity of key characteristics. Key characteristics of the design of the cartridge for which product uniformity is essential to assure the required performance, safety and reliability shall be identified, and their acceptable variability limits shall be established during design verification.

3.1.2 Product baseline. Successful completion of design verification shall constitute the product baseline. Once the product baseline is established, any change of design, material or manufacturing process shall require a new design verification to establish a new product baseline.

3.2 First article inspection. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.3.

3.2.1 Physical configuration audit. A sample of the cartridges shall be subjected to a configuration audit of physical characteristics established by the product baseline.

3.3. Conformance inspection When specified (see 6.2), a sample of the cartridges shall be subjected to conformance inspection in accordance with 4.4.

3.4 Interface and interoperability requirements.

3.4.1 Cartridge identification.

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3.4.1.1 Case Color. Each cartridge shall be visually identifiable as a breaching cartridge by a clear/opaque case with permanent brown color tip identification marking which shall start at the nose of the cartridge and extend down not less than 25 percent of the cartridge case wall. Otherwise it shall have a case molded entirely in brown. The color of this case marking shall conform to FED-STD-595/30117.

3.4.1.2 Head Stamp. The cartridge head shall be stamped with the following:

- a) 12 GA;
- b) M1030;
- c) Initials of Manufacturer or Recognized Trade Name; and (or other identification)
- d) Last 2 figures of the year of manufacture.

3.4.1.3 Marking. The cartridge shall be permanently marked in lusterless white conforming to FED-STD-595/37875; or lusterless silver conforming to FED-STD-595/37722 for cases molded in brown or marked in brown conforming to FED-STD-595/30117 for clear/opaque cases, and shall be not less than 1/8 inch, with the following text:

CRTG, 12 GAUGE  
BREACHING  
M1030

3.4.2 Cartridge physical dimensions. The cartridge dimensions shall conform to 12990872.

3.5 Operational requirements.

3.5.1 Breaching. The impact of the projectile(s), when fired at a distance of 2 meters  $\pm$  6 inches (Mossberg 590) and 3 inches  $\pm$  1 inch (Remington 870), against the door lock, hinge, and padlock hasp, shall cause the door lock mechanism, hinge, and padlock hasp to effectively disconnect with the application of 33 ft-lbs of force. Breaching shall be accomplished by not more than two shots per hinge and one shot each for locking door knob and padlock hasp.

3.5.2 Velocity. The mean velocity of the cartridge, shall not vary by greater than  $\pm$  5% from the product baseline velocity. The design velocity baseline is the mean velocity (uncorrected) obtained during design verification.

3.5.3 Accuracy. The average center of impact of the 5 shot groups, fired at ambient temperature, shall not exceed 2 inches from the point of aim at a target 2 meters from the muzzle of the Mossberg Model 590 shotgun.

3.5.4 Dispersion. The average of the extreme spread of the five shot groups used for accuracy shall not exceed 2 inches at a range of 2 meters.

3.5.5 Chamber pressure. The maximum mean chamber pressure of the cartridge, when conditioned at hot, cold, and ambient temperatures, shall be not greater than 13,000 psi (pounds

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per square inch). The maximum chamber pressure for any individual cartridge shall not exceed 15,000 psi.

3.5.6 Function and casualty. The cartridge shall function without casualty when fired from the Mossberg 590 and Remington 870 shotguns with a cylindrical bore(see 6.13).

3.5.7 Ricochet from target impact. There shall be no projectile or projectile fragments upon target impact that could cause injury to the operator.

3.5.8 Projectile ballistic integrity. The cartridge projectile shall not burst nor fragment in the barrel or during the entire flight when fired. The projectile shall be non-explosive, and shall not produce shrapnel when fired, or during trajectory.

3.5.9 Projectile material. The projectile shall contain no lead or other toxic heavy metals considered hazardous whether or not they are cited in EPA-745-R-99-004 (EPA 33/50 Program - The Final Record; Box 1 - 17 Targeted Chemicals).

3.5.10 Primed case sensitivity. The energy imparted by a steel ball weighing  $1.94 \pm 0.02$  ounces falling 12 inches onto a simulated firing pin shall cause initiation of the primer. The energy imparted by a steel ball weighing  $1.94 \pm 0.02$  ounces falling 2 inches onto a simulated firing pin shall not cause initiation of the primer.

### 3.6 Environmental requirements.

3.6.1 Waterproofness. After 8 hours of water immersion, the cartridge shall meet stated performance requirements for muzzle velocity and chamber pressure, and shall not misfire.

3.6.2 Chemical compatibility. The cartridge shall function safely in the service weapons after exposure to the following cleaning and lubricating chemicals:

<u>Description</u>	<u>Specification</u>
Cleaning compound, solvent (rifle bore cleaner)	MIL-PRF-372
Lubrication, semifluid, automatic weapons (LSA)	MIL-L-46000
Cleaner, lubricant, preservative (CLP)	MIL-PRF-63460
Carbon Removing Compound	NSN 6850-00-965-2332
Lubricant, arctic weapons (LAW)	MIL-PRF-14107
Standard practice for the preparation of substitute ocean water	ASTM-D-1141
Dry cleaning solvent (type I)	MIL-PRF-680
Decontaminating agent (STB)	MIL-DTL-12468

3.6.3 Sequential Rough Handling. The cartridges shall show no degradation in safety or performance after exposure to the following rough handling conditions;

- a. Secured cargo vibration
- b. Loose cargo bounce test

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- c. Unpackaged cartridge dropped 1.5 meters
- d. Cartridges, packaged in accordance with the packaging provisions of the contract, dropped 2.1 meters

3.6.4 12.2 Meter packaged drop. When packaged in accordance with the packaging provisions of the contract and subjected to a 12.2 meter drop, the cartridges shall not detonate or burn, deflagrate, lose propellant, and the ammunition shall be safe to handle and dispose by the applicable handling and disposal regulations without injury to personnel.

3.6.5 Temperature and humidity. The cartridge shall show no evidence of corrosion after being subjected to a temperature and humidity storage environment which ranges from 105 °F (41 °C) to 70 °F (21 °C) and 90%-95% humidity over a period of 24 hours, and then shall function in the weapons.

3.6.6 Long term storage. After being subjected to an extreme temperature/long term storage environment, the mean muzzle velocity shall not decrease from the baseline mean muzzle velocity at ambient temperature by greater than 5%. Cartridges shall also meet the chamber pressure requirements of paragraph 3.5.5.

3.6.7 Salt fog. The cartridge shall meet all performance requirements and function without degradation after exposure to a 5% salt fog environment for 48 hours.

3.6.8 Thermal shock. The cartridge shall meet all performance requirements and function after exposure to alternatively high and low temperature extremes.

3.6.9 Noise. The mean maximum peak sound pressure level of the cartridge when fired shall be not greater than 170 decibels with a B-duration of  $15 \pm 10$  milliseconds, at typical shooter position.

### 3.7 Support and ownership requirements

3.7.1 Ammunition lot number. Ammunition lot numbers shall be assigned in accordance with MIL-STD-1168.

3.7.2 Energetic material qualification. The energetic material used shall be qualified by the Army Service Qualification Authority for the specified use. (see 6.9).

3.7.3 Energetic materials compatibility. All energetic materials (such as explosives, propellants, pyrotechnics) utilized shall be compatible with all combinations of directly contacting energetic and non-energetic materials.

3.7.4 Propellant stability. All propellants shall be stable over a time period not less than 5 years.

3.7.5 Final hazard classification (FHC). The cartridge shall comply with the following minimum Hazard Classification when packaged in accordance with packaging requirements in the contract.



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DOD Hazard Class/Div: 1.4  
DOD Hazard Compatibility Group: S  
DOT Hazard Class: 1.4S

3.7.6 Reliability. The cartridge shall have an average reliability not less than 0.95% during functioning at hot, cold, and ambient temperatures.

3.7.7 Explosive ordnance disposal (EOD). The cartridge shall be capable of being rendered safe and disposed of by EOD in all field environments.

3.7.8 Workmanship. The cartridge shall be free of cracks, splits, perforations, burrs and foreign matter. The cleaning method used shall not be injurious to any parts, nor shall the parts be contaminated by any cleaning agent.

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## 4. VERIFICATION

TABLE I. Requirements/verification cross-reference matrix

Section 3 Requirement		METHOD OF VERIFICATION							CLASSES OF VERIFICATION
		1- Analysis 2 - Demonstration 3 - Examination 4 - Test							A - Design verification B - First Article C - Conformance
		Verification Methods				Verification Class			Section 4 Verification
		1	2	3	4	A	B	C	
3.1	Design Verification	X	X	X	X	X			4.2, TABLE II
3.1.1	Product Uniformity		X	X	X	X	X	X	4.2.1
3.1.2	Product Baseline	X	X	X	X	X			4.2.2
3.2	First Article Test		X	X	X		X		4.3, TABLE III
3.2.1	PCA			X			X	X	4.3.2
3.3	Conformance inspection		X	X	X			X	4.4, TABLE IV
3.4.1.1	Case Color			X		X	X	X	4.5.1
3.4.1.2	Head Stamp			X		X	X	X	4.5.1
3.4.1.3	Marking			X		X	X	X	4.5.1
3.4.2	Physical dimensions			X		X	X	X	4.5.2, TABLE V
3.5.1	Breaching				X	X	X		4.6.1
3.5.2	Velocity				X	X	X	X	4.6.2
3.5.3	Accuracy				X	X	X	X	4.6.3
3.5.4	Dispersion				X	X	X	X	4.6.4
3.5.5	Chamber Pressure				X	X	X	X	4.6.5
3.5.6	Function & casualty				X	X	X	X	4.6.6
3.5.7	Ricochet				X	X	X	X	4.6.7
3.5.8	Projectile Ballistic Integrity				X	X	X	X	4.6.8
3.5.9	Projectile Material	X				X			4.6.9
3.5.10	Primed Case Sensitivity				X	X	X	X	4.6.10
3.6.1	Waterproofness				X	X	X	X	4.7.1
3.6.2	Chemical Compatibility				X	X			4.7.2
3.6.3	Sequential Rough Handling				X	X			4.7.3
3.6.4	12.2 Meter drop				X	X			4.7.4
3.6.5	Temperature & Humidity				X	X			4.7.5
3.6.6	Long Term Storage				X	X			4.7.6
3.6.7	Salt Fog				X	X			4.7.7
3.6.8	Thermal Shock				X	X			4.7.8
3.6.9	Noise				X	X			4.7.9
3.7.1	Ammunition Lot Number			X				X	4.8.1
3.7.2	Energetic material qualification				X	X			4.8.2
3.7.3	Energetic material compatibility				X	X			4.8.3
3.7.4	Propellant Stability				X	X			4.8.4

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TABLE I. Requirements/verification cross-reference matrix - Continued

Section 3 Requirement		METHOD OF VERIFICATION				CLASSES OF VERIFICATION		
		1 - Analysis 2 - Demonstration 3 - Examination 4 - Test				A - Design verification B - First Article C - Conformance		
		Verification Methods				Verification Class		
		1	2	3	4	A	B	C
3.7.5	Final hazard Classification		X			X		
3.7.6	Reliability				X	X	X	
3.7.7	Explosive Ordnance Disposal	X	X	X		X		
3.7.8	Workmanship			X		X	X	X

4.1 Classification of verifications. The verification requirements specified herein are classified as follows:

- a. Design verification (see 4.2)
- b. First article inspection (see 4.3)
- c. Conformance verification (see 4.4)

4.1.1 Classification of characteristics. When specified in examinations and tests cited herein; critical, major, and minor characteristics are in accordance with MIL-STD-1916.

4.2 Design verification. When specified, a sample of the cartridge and components shall undergo design verification by examination, analysis, demonstration and tests in accordance with TABLE II..

4.2.1 Product uniformity of key characteristics. Verify by examination of objective evidence and analysis that key characteristics have been identified and variability limits have been established.

4.2.2 Product baseline. Verify by examination of objective evidence that the product baseline has been established and is complete.

4.2.3 Design verification rejection. If any item of the sample fails to comply with the design verification requirements specified in TABLE II, the sample shall be rejected, and the design shall not be verified.

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TABLE II. Design verification inspection

EXAMINATION OR TEST	CONFORMANCE CRITERIA			REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
	QTY	Ac	Re		
Product Uniformity	150	0	1	3.1.1	4.2.1
Cartridge Identification	MIL-STD-1916 Level IV			3.4.1	4.5.1
Physical Parameters	MIL-STD-1916 and TABLE V			3.4.2	4.5.2
Breaching					
a. Mossberg - Cold	32	TABLE VII		3.5.1	4.6.1
b. Mossberg - Ambient	32	TABLE VII		3.5.1	4.6.1
c. Mossberg - Hot	32	TABLE VII		3.5.1	4.6.1
d. Remington - Cold	32	TABLE VII		3.5.1	4.6.1
e. Remington - Ambient	32	TABLE VII		3.5.1	4.6.1
f. Remington - Hot	32	TABLE VII		3.5.1	4.6.1
Velocity					
a. Cold	50	1/		3.5.2	4.6.2
b. Ambient	50	1/		3.5.2	4.6.2
c. Hot	50	1/		3.5.2	4.6.2
Accuracy	50	1/		3.5.3	4.6.3
Dispersion	50	1/		3.5.4	4.6.4
Chamber Pressure					
a. Cold	50	1/		3.5.5	4.6.5
b. Ambient	50	1/		3.5.5	4.6.5
c. Hot	50	1/		3.5.5	4.6.5
Function & casualty	600	TABLE VIII		3.5.6	4.6.6
Ricochet 2/					
a. Cold	4	0	1	3.5.7	4.6.7
b. Ambient	4	0	1	3.5.7	4.6.7
c. Hot	4	0	1	3.5.7	4.6.7
Projectile Ballistic Integrity					
a. Cold	4	0	1	3.5.8	4.6.8
b. Ambient	4	0	1	3.5.8	4.6.8
c. Hot	4	0	1	3.5.8	4.6.8
Projectile Material				3.5.9	4.6.9
Primed Case Sensitivity	75	1/		3.5.10	4.6.10
Waterproofness	50	0	1	3.6.1	4.7.1
Chemical Compatibility	45	1/		3.6.2	4.7.2
Sequential Rough Handling	108	TABLE VIII		3.6.3	4.7.3
12.2 Meter drop	640	0	1	3.6.4	4.7.4
Temperature & Humidity	100	TABLE VIII		3.6.5	4.7.5
Long Term Storage	200	TABLE VIII		3.6.6	4.7.6
Salt Fog	50	0	1	3.6.7	4.7.7
Thermal Shock	50	0	1	3.6.8	4.7.8
Noise	10	1/		3.6.9	4.7.9
Energetic material qual.	1/			3.7.2	4.8.2
Energetic material comp.	1/			3.7.3	4.8.3

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TABLE II. Design verification inspection – continued

EXAMINATION OR TEST	CONFORMANCE CRITERIA			REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
	QTY	Ac	Re		
Propellant Stability	50 gm	<u>1</u> /		3.7.4	4.8.4
Final hazard Classification	4069	<u>1</u> /		3.7.5	4.8.5
Reliability	1200	<u>1</u> /		3.7.6	4.8.6
Explosive Ordnance Disposal		<u>1</u> /		3.7.7	4.8.7
Workmanship		<u>1</u> /		3.7.8	4.8.8
Notes:					
<u>1</u> /. The design shall be rejected if the requirement is not met.					
<u>2</u> /. One shot shall be fired at each of the four doors.					

4.3 First article inspection. When specified in the contract, a sample of the cartridge and components shall be subjected to first article verification in accordance with TABLE III.

4.3.1 First article rejection. If any assembly, component or test specimen fails to comply with any of the applicable requirements, the first article sample shall be rejected (see 6.11).

4.3.2 Physical configuration audit. A physical configuration audit shall be performed on 55 cartridges by examination and measurement, using standard measurement equipment (SME).

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TABLE III. First article tests and inspection

EXAMINATION OR TEST	CONFORMANCE CRITERIA			REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
	QTY	Ac	Re		
Product Uniformity	150	0	1	3.1.1	4.2.1
Product Baseline				3.1.2	4.2.2
Cartridge Identification	MIL-STD-1916, Level IV			3.4.1	4.5.1
Physical Parameters	MIL-STD-1916 and TABLE V			3.4.2	4.5.2
Breaching					
a. Mossberg - Cold	32	TABLE VII		3.5.1	4.6.1
b. Mossberg - Ambient	32	TABLE VII		3.5.1	4.6.1
c. Mossberg - Hot	32	TABLE VII		3.5.1	4.6.1
d. Remington - Cold	32	TABLE VII		3.5.1	4.6.1
e. Remington - Ambient	32	TABLE VII		3.5.1	4.6.1
f . Remington - Hot	32	TABLE VII		3.5.1	4.6.1
Velocity					
a. Cold	50	<u>1/</u>		3.5.2	4.6.2
b. Ambient	50	<u>1/</u>		3.5.2	4.6.2
c. Hot	50	<u>1/</u>		3.5.2	4.6.2
Accuracy	50	<u>1/</u>		3.5.3	4.6.3
Dispersion	50	<u>1/</u>		3.5.4	4.6.4
Chamber Pressure					
a. Cold	50	<u>1/</u>		3.5.5	4.6.5
b. Ambient	50	<u>1/</u>		3.5.5	4.6.5
c. Hot	50	<u>1/</u>		3.5.5	4.6.5
Function & casualty	600	TABLE VIII		3.5.6	4.6.6
Ricochet <u>2/</u>					
a. Cold	4	0	1	3.5.7	4.6.7
b. Ambient	4	0	1	3.5.7	4.6.7
c. Hot	4	0	1	3.5.7	4.6.7
Projectile Ballistic Integrity					
a. Cold	4	0	1	3.5.8	4.6.8
b. Ambient	4	0	1	3.5.8	4.6.8
c. Hot	4	0	1	3.5.8	4.6.8
Primed Case Sensitivity	75	<u>1/</u>		3.5.10	4.6.10
Waterproofness	50	0	1	3.6.1	4.7.1
Reliability	1200	<u>1/</u>		3.7.6	4.8.6
Workmanship		<u>1/</u>		3.7.8	4.8.8
Notes:					
<u>1/</u> . The first article sample shall be rejected if the requirement is not met.					
<u>2/</u> . One shot shall be fired at each of the four doors.					

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4.4 Conformance inspection. When specified (see 6.2), sample cartridges and components shall undergo conformance inspection by examination, analysis, demonstration and tests as specified in TABLE IV.

4.4.1 Lot formation. Lot formation shall be established in accordance with MIL-STD-1916. Unless otherwise specified, component parts shall be homogenous and of a size convenient to be inspected, tested and accepted. The cartridge lot shall contain:

- a. Cartridge cases from one unchanged process and from one manufacturer.
- b. Primers from one lot interfix number and one manufacturer.
- c. Propellant from no more than two lot interfix numbers and from one manufacturer

4.4.2 Verification by classification of defects. Certain required characteristics may have varying degrees of defects that are classified in accordance with the potential consequences of non-conformance. These defects are classified as critical, major and minor in accordance with MIL-STD-1916, and when used are presented in tabular format.

4.4.3 Attribute sampling. The attribute sampling required for the examination for defects in TABLE IV shall be in accordance with the attribute sampling plan of MIL-STD-1916, using verification level IV for Major characteristics and level II for Minor characteristics. One hundred percent inspection shall be used on all Critical characteristics.

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TABLE IV. Conformance tests

EXAMINATION OR TEST	CONFORMANCE CRITERIA			REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
	QTY	Ac	Re		
Product Uniformity	150	0	1	3.1.1	4.2.1
Cartridge Identification <u>1/</u>	MIL-STD-1916, Level IV			3.4.1	4.5.1
Physical Parameters	MIL-STD-1916 and TABLE V			3.4.2	4.5.2
Breaching	<u>2/</u> <u>3/</u>	TABLE VII		3.5.1	4.6.1
Velocity					
a. Cold	25	<u>3/</u>	<u>2/</u>	3.5.2	4.6.2
b. Ambient	25	<u>3/</u>	<u>2/</u>	3.5.2	4.6.2
c. Hot	25	<u>3/</u>	<u>2/</u>	3.5.2	4.6.2
Accuracy	50	<u>3/</u>		3.5.3	4.6.3
Dispersion	50	<u>3/</u>		3.5.4	4.6.4
Chamber Pressure					
a. Cold	25	<u>3/</u>		3.5.5	4.6.5
b. Ambient	25	<u>3/</u>		3.5.5	4.6.5
c. Hot	25	<u>3/</u>		3.5.5	4.6.5
Function & casualty	600	TABLE VIII		3.5.6	4.6.6
Ricochet					
a. Cold	5	0	1	3.5.7	4.6.7
b. Ambient	5	0	1	3.5.7	4.6.7
c. Hot	5	0	1	3.5.7	4.6.7
Projectile Ballistic Integrity					
a. Cold	5	0	1	3.5.8	4.6.8
b. Ambient	5	0	1	3.5.8	4.6.8
c. Hot	5	0	1	3.5.8	4.6.8
Waterproofness	50	0	1	3.6.1	4.7.1
Ammunition Lot Number <u>1/</u>	MIL-STD-1916, Level II			3.7.1	4.8.1
Workmanship	3/			3.7.8	4.8.8

## Notes:

1/ Levels II and IV refer to those verification levels of TABLE II attributes sampling plan in MIL-STD-1916.

2/ Breaching testing is only required if the cartridge fails the minimum velocity requirement. In that case testing will performed in accordance with TABLE III.

3/. The lot shall be rejected if the requirement is not met.



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TABLE V. Examination of defects

EXAMINATION OR TEST	CONFORMANCE CRITERIA <u>2/</u>	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE	AC / RE
Critical:				
1. Bottom rim split <u>1/</u> , <u>3/</u>	100%	3.7.8	Visual	0/1
2. Perforated or split case with propellant loss <u>1/</u> , <u>3/</u>	100%	3.7.8	Visual	0/1
3. Primer above flush <u>3/</u>	100%	3.7.8	SME	0/1
4. Low propellant weight <u>3/</u>	100%	3.7.8	SME	0/1
Major:				
101. Mashed head <u>1/</u> , <u>3/</u>	100%	3.7.8	Visual	0/1
102. Low primer charge weight <u>3/</u>	100%	3.7.8	SME	0/1
103. No primer <u>1/</u> , <u>3/</u>	100%	3.7.8	Visual	0/1
104. Cocked primer <u>1/</u> , <u>3/</u>	100%	3.7.8	Visual	0/1
105. Inverted primer <u>1/</u> , <u>3/</u>	100%	3.7.8	Visual	0/1
106. Perforated or split case <u>1/</u> , <u>3/</u>	100%	3.7.8	Visual	0/1
107. Cartridge length, max	Level IV	3.4.2	SME	0/1
108. Rim thickness, max	Level IV	3.4.2	SME	0/1
109. Head diameter, max	Level IV	3.4.2	SME	0/1
110. Case diameter, max	Level IV	3.4.2	SME	0/1
111. Open crimp <u>1/</u>	Level IV	3.7.8	Visual	0/1
112. Defective head <u>1/</u>	Level IV	3.7.8	Visual	0/1
113. Sheared case over head <u>1/</u>	Level IV	3.7.8	Visual	0/1
114. Defective body <u>1/</u>	Level IV	3.7.8	Visual	0/1
115. Battery cup defects <u>1/</u>	Level IV	3.7.8	Visual	0/1
Minor:				
201. Illegible or missing cartridge identification	Level II	3.4.1	4.5.1	0/1
Notes:				
<u>1/</u> Refer to shotshell/shotgun section of MIL-STD-636 for Visual Standards of defects.				
<u>2/</u> Levels II and IV refer to those verification levels of TABLE II attributes sampling plan in MIL-STD-1916.				
<u>3/</u> One hundred percent of the entire lot shall be inspected for these defects.				

4.5 Interface and interoperability verification

4.5.1 Cartridge identification The cartridge identification shall be verified by visual inspection. The colors shall be verified using FED-STD-595/35109, 37875, and 37722 color chips.

4.5.2 Cartridge physical dimensions. The cartridge dimensions shall be verified by standard measurement equipment or specialty gauges.

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4.6 Operating verification. All ballistic testing shall be examined against Table VIII. For any ballistic test except function and casualty, where the occurrence of a firing defect prevents the obtaining of a valid result for the characteristic being tested, the defect shall be observed. The particular test for which the round was fired shall not be penalized. A replacement round shall be fired for test purposes.

Operating verifications shall be conducted using both:

- a. Mossberg Model 590, Stock No 52660, 20 inch barrel, cylindrical bore
- b. Remington Model 870, 18 inch barrel, cylindrical bore

#### 4.6.1 Breaching.

4.6.1.1 The test shall be conducted in accordance with TABLE VI. The cartridges shall be fired from two Mossberg Model 590, from a range of 2 meters and two Remington Model 870, from a range up to 3-inches. A 1-3/4 inch thick, 32 or 36 inch wide, pre-hung solid pine, fir or particle board exterior inward swinging entry door that has been securely mounted between two wooden framed walls that have been constructed and installed in accordance with standard house building procedures. Installment shall include shimming and squaring of the doorframe, as necessary, to prevent binding of the door. The door shall have three 4-inch standard hinges, residential quality, Stanley Part No. 08-3026, 08-3023, or equivalent. All standard 1-inch hinge screws securing the hinges to the jamb shall be replaced with 3-inch wood screws, and both sides of the walls are to be covered with 1/2 inch thick plywood sheathing for rigidity. The door shall be fitted with Grade 2 locking doorknob (BHMA A156.2-2003 or equivalent), and with a simple four-screw hinged hasp, mounted with 1 inch wood screws. Test temperature requirements in TABLE II. There will be a total of 8 shots per door. One for the hasp, one for the locking doorknob, and two into each of the three hinges. Each of the following breaching situations shall be conducted and evaluated:

- a. Fire perpendicularly between the Grade 2 locking doorknob and door jam area.
- b. Fired perpendicularly into the hasp secured by a laminated steel padlock.
- c. Fired at each of the 3 hinges attached to the door at an impact angle, relative to the plane of the door, of 45 degrees

TABLE VI: Shotgun-door test matrix

Weapons*	Distance	<u>Total Number of Doors</u>		
		<u>Cold</u>	<u>Ambient</u>	<u>Hot</u>
Mossberg 590	2 meters	4	4	4
Remington 870	Up to 3-inches	4	4	4

\* 2 doors per weapon

4.6.1.2 After each shot set, previously secured door shall be open, or can be opened, through the application of a simulated kick of not greater than 33 ft-lbs of energy (applied 36

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inches above the bottom edge of the door and 6 inches) to the desired side. After the locking doorknob has been shot and immediately following the firing on all hinges, the application of the simulated kick shall be performed as specified in ASTM F 476, Door Ram method, except apparatus shall be modified so that 33 ft-lbs shall be applied. Acceptance criteria are summarized in TABLE VII below.

TABLE VII: Acceptance Criteria

<u>Location</u>	<u>Number of Shots</u>	
	<u>Accept</u>	<u>Reject</u>
Hasp	1	> 1
Locking doorknob	1	> 1
Per Hinge	2	> 2

4.6.2 Velocity. All velocity tests shall be conducted in accordance with ANSI/SAAMI Z299.2-1992. This test shall be performed simultaneously with the chamber pressure test, 4.6.5. The cartridges shall be conditioned, at cold, ambient, and hot temperatures (see 6.10).

4.6.3 Accuracy. This accuracy test shall be conducted in accordance with TOP 4-2-016, Accuracy and Dispersion. Each shot group consists of 10 cartridges fired at the target. This test shall be performed simultaneously with the dispersion test.

4.6.4 Dispersion. The average of the extreme spread of the 5 shot groups, fired at ambient temperature, at a range of 2 meters, shall be not greater than 2 inches. This dispersion test shall be conducted in accordance with TOP 4-2-016, Accuracy and Dispersion. Each shot group consists of 10 cartridges fired at the target. This test shall be performed simultaneously with the accuracy test.

4.6.5 Chamber pressure. The chamber pressure test shall be conducted in accordance with ANSI/SAAMI Z299.2-1992 for 2-3/4" slugs. The cartridges shall be conditioned, at cold, ambient, and hot temperatures (see 6.10). This test shall be performed simultaneously with the velocity test.

4.6.6 Function and casualty. The test shall be performed in accordance TOP 3-2-045, Endurance Test, except that the quantity of cartridges shall comply with TABLES II, III or IV as appropriate. Each expended cartridge shall be inspected for defects in accordance with MIL-STD-636 and TABLE VIII. The weapons shall be cleaned and lubricated before firing at each temperature. This test shall be performed simultaneously with the reliability test.

a. For Design Verification testing, the cartridges and weapons shall be tested at hot, cold, and ambient temperatures. When firing inside a temperature conditioning chamber, after 30 cartridges, the weapon shall be allowed dwell time to return to the specified temperature. If firing inside a temperature conditioning chamber is not feasible, after 30 shots, the weapon shall be reconditioned for 2 hours at the respective temperature.

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b. For First Article and Conformance testing, only the conditioned cartridges shall be tested after conditioned for not less than 4 hours at hot, cold, and ambient temperatures (see 6.10). Cartridges shall be fired within 20 minutes after removal from an environmental chamber.

c. The lot shall be rejected when function and casualty defects and firing defects observed in all other firing tests exceed the acceptance numbers in TABLE VIII.

TABLE VIII. Function and casualty firing defect criteria

Defect Description <u>1/</u>	Acceptance	Rejection	Classification
1. Projectile in bore/Failure to extract	0	1	Critical
2. Misfire: Due to contaminated propellant	0	1	Critical
3. Misfire: Due to low propellant	0	1	Critical
4. Burst rim	0	1	Major
5. Misfire	0	1	Major
6. Misfire - No Vent Hole	0	1	Major
7. Projectile breakup	0	1	Major
8. Blown primer or battery cup	0	1	Major
9. Blown base wad	0	1	Major
10. Head pulled off	0	1	Major
11. Head cut off	0	1	Major
12. Dropped primer or battery cup	0	1	Major
13. Misfire	0	1	Major
14. Body cut off	0	1	Major
15. Failure to eject	0	1	Major
16. Excessive fouling	0	1	Major
17. Head split	1	2	Major
18. Split knurl	1	2	Major
19. Split mouth	1	2	Major
20. Partial cut off	1	2	Major
21. Rupture	1	2	Major
22. Partial split	1	2	Major
23. Head start	1	2	Major
24. Bulged rim	1	2	Major
25. Body split	1	2	Major
26. Powder burns	1	2	Major
27. Primer set back	1	2	Major
28. Battery cup set back	1	2	Major
29. Primer pierced	1	2	Major
30. Primer punctured	1	2	Major
Cumulative defects for #17. – 30.	3	4	Major
NOTES <u>1/</u> For defects refer to MIL-STD-636, shotshell cartridges section, for Visual Standards of defects.			

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4.6.7 Ricochet from target impact. Only the Remington 870 will be used for this test. For design verification and first article test, a 1.5 meter square witness panel of Celotex 11.1 millimeters thick or equivalent shall be mounted at the weapon chamber position, by cutting a hole in the middle of the Celotex and sliding it down the barrel. Any penetration of the witness screen other than target fragments shall be considered ricochet and shall be cause to reject the lot. The cartridges shall be conditioned, at cold, ambient, and hot temperatures (see 6.10). This test shall be performed simultaneously with the lock cylinder breaching test at up to 3 inches. One shot shall be fired at each of the four doors.

For conformance inspection, the cartridges shall be at a solidly mounted one-meter square by 1-3/4" thick solid hardwood (or plywood) target placed 3-inches from the muzzle of the weapon. A 1.5 meter square witness panel of Celotex 11.1 millimeters thick or equivalent shall be mounted at the weapon chamber position. Any penetration of the witness screen other than target fragments shall be considered blowback and shall be cause to reject the lot. The cartridges shall be conditioned, at cold, ambient, and hot temperatures (see 6.10). This test shall be performed simultaneously with Function & Casualty.

4.6.8 Projectile ballistic integrity. Only the Mossberg 590 will be used for this test. For design verification and first article test, the cartridges shall be fired at a one-meter square witness screen of kraft paper (60 pound base weight or equivalent) placed at 1 meter in front of the muzzle of the weapon. Perforation of the witness screen by anything other than a projectile or a complete sub-projectile segment shall be cause to reject the lot. The cartridges shall be conditioned, at cold, ambient, and hot temperatures (see 6.10). This test shall be performed simultaneously with the lock cylinder breaching test at 2 meters. One shot shall be fired at each of the four doors.

For conformance inspection, the cartridges shall be fired at a one-meter square witness screen of kraft paper (60 pound basis weight or equivalent) placed at 1 meter in front of the muzzle of the weapon. Perforation of the witness screen by anything other than a projectile or a complete sub-projectile segment shall be cause to reject the lot. Penetration due to unburned propellant shall not cause reject of the lot. The cartridges shall be conditioned, at cold, ambient, and hot temperatures (see 6.10). This test shall be performed simultaneously with Function & Casualty.

4.6.9 Projectile material. Verification of projectile material shall be accomplished by examination during design verification (see 6.2).

4.6.10 Primed case sensitivity. The test shall be performed in accordance with TECP 700-700, Primer tests. The steel ball shall weigh  $1.94 \pm 0.02$  ounces. The simulated firing pin shall have a spherical end radius of  $0.0500 \pm 0.0025$  inches and have a normal weight of 70 grams with empty primed cases.

a. For Design Verification test, the sensitivity rundown test shall consist of a 25-cartridge test at each 1-inch increment of height between 0% and 100% firing. If the average critical height (H) plus four standard deviations (4 sigma) exceeds 14 inches, or if the average critical

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height minus two standard deviations (2 sigma) is less than 1 inch, the lot of cartridges shall be rejected.

b. For First Article and Conformance test, two-thirds of the sample shall be tested at a height of 12 inches and one-third of the sample shall be tested at a height of 2 inches. The primer shall not ignite at 2 inches. The primer shall ignite at 12 inches. If one or more cartridge primers fail at either height, the sample fails and a sensitivity rundown test shall be conducted. The sensitivity rundown test shall consist of a 25-cartridge test at each 1-inch increment of height between 0% and 100% firing. If the average critical height (H) plus four standard deviations (4 sigma) exceeds 14 inches, or if the average critical height minus two standard deviations (2 sigma) is less than 1 inch, the lot of cartridges shall be rejected.

#### 4.7 Environmental Verification

4.7.1 Waterproofness. Cartridges shall be immersed horizontally in water at a depth of one inch minimum for 8 hours  $\pm$  0.5 hour. After immersion in water, the cartridges shall be subjected to the pressure and velocity tests at ambient temperature within 1 hour after water immersion in accordance with 4.6.2 and 4.6.5.

4.7.2 Chemical compatibility. The test shall be performed in accordance with TOP 3-2-609, Chemical Compatibility.

4.7.3 Sequential Rough Handling. Testing shall be conducted in accordance with ITOP 4-2-602, for the following sequential rough handling.

##### a. Transportation-vibration (secured cargo) phase (320 rounds).

The testing shall be performed on two 320 round samples, one conditioned at  $63^{\circ}\text{C} \pm 1.7^{\circ}$  ( $145^{\circ}\text{F} \pm 3^{\circ}$ ) and the other conditioned at  $-51^{\circ}\text{C} \pm 1.70$  ( $-60^{\circ}\text{F} \pm 3^{\circ}$ ). The test ammunition shall be packaged as follows: 5 cartridges per paperboard carton; 160 cartridges (32 cartons) per M2A1 can (drawings 7553296 and 9396197). At the end of each phase, a sample of 80 rounds shall be withdrawn and 20 rounds shall be fired from each of the three service weapons for function and casualty in accordance with the requirements of paragraph 4.6.6.

Two M2A1 cans of ammunition shall be secured in a wirebound box (drawings 7553347 and 9396206) and temperature conditioned at  $63^{\circ}\text{C} \pm 1.7^{\circ}$  ( $145^{\circ}\text{F} \pm 3^{\circ}$ ) for a minimum of 4 hours. Two M2A1 cans of ammunition shall be secured in a wirebound box (drawings 7553347 and 9396206) and temperature conditioned at  $-51^{\circ}\text{C} \pm 1.70$  ( $60^{\circ}\text{F} \pm 3^{\circ}$ ) for a minimum of 4 hours. The test ammunition shall be subjected to the secured cargo vibration simulation in each of the three major orthogonal axes (vertical, transverse, and longitudinal). The cartridges shall be reconditioned for a minimum of 4 hours between axes of vibration, except when two axes of vibration are conducted sequentially within the same day. When the latter occurs, the cartridges shall be moved directly from one test orientation to the next. The time that the cartridges are out of temperature for movement between the conditioning chamber and the test cell, as well as the test setup, shall be regained in conditioning at a 1:1 ratio prior to the start of testing. The conditioning and vibration chamber temperatures shall be maintained within  $\pm 1.7^{\circ}\text{C}$  ( $\pm 3^{\circ}\text{F}$ ) of the required test temperature.

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The vibration schedules used shall represent the secured cargo transportation modes for a typical field/mission transport scenario over secondary and cross-country road surfaces as described in ITOP 1-2- 601, Appendix B, Table B-I, except as classified and expanded below.

The first vibration schedule shall represent the vibration environment on the cargo bed of a composite of tactical vehicles consisting of the M1 27 12-ton semitrailer, M8 13 and M8 14 5-ton trucks, M3 6 2½-ton truck, commercial utility cargo vehicle (CUCV) M1 008 1 ¼-ton truck, the high mobility multipurpose wheeled vehicle (HMMWV) M998 1¼-ton truck, and the heavy expanded mobility tactical truck (HEMMT) M985 10-ton truck. This test shall represent 800 km (500 mi.) of secured cargo transport per test axis.

The second vibration schedule shall represent the off-road conditions on the cargo bed of the ¼-ton M4 16 and the 1 ¼-ton M1 05A2 two-wheeled trailer. The composite two-wheeled trailer vibration environment shall simulate 25 km (16 mi.) of secured cargo transport per test axis.

The third vibration schedule shall represent the environment on the cargo bed of the M548 tracked vehicle. This test shall represent 25 km (16 mi.) of secured cargo transport per test axis.

At the completion of each axis of vibration, the exterior surfaces of all containers shall be visually examined for damage. For the final inspection (after all axes of vibration), the M1A2 ammunition cans shall be opened and the cartridges shall be visually inspected. Sixty cartridges from each temperature shall be removed from the test sequence and subjected to function and casualty firing. The remaining cartridges shall be repacked, using new wirebound boxes, and prepared for the 2.1-meter drop test.

b. Loose cargo (packaged) vibration (160 rounds). Testing shall be conducted with cartridges packed in accordance with packaging provisions of the contract, and in accordance with ITOP 4-2-602, Appendix Loose Cargo Test, except as classified and expanded below.

The laboratory test shall represent 120 km (75 mi.) of loose cargo transport during off-road transport. The table shall be operated, shafts in phase, in a circular motion with a constant displacement of 25mm (1 in.), double amplitude, at a speed of 300 rpm, thus producing a table acceleration of 1.3 g's (1.3 times the acceleration from gravity). The packaged ammunition shall be tested for 15 minutes in each of two orientations: transverse and longitudinal. For the longitudinal axis, packaged ammunition shall be placed on the table with the longitudinal axis of the cartridges parallel to the transverse axis of the table surface. For the transverse axis, packaged ammunition shall be placed on the table with the longitudinal axis of the cartridges parallel to the longitudinal axis of the table surface.

A wooden retaining fence section shall be placed around the perimeter of a section of the bed of the package tester to prevent the ammunition containers from falling off the table and shall be positioned so that free space of approximately 25mm exists on all sides of the packaged ammunition. Testing shall be performed on the steel-covered bed with the temperature enclosure in position. The loose cargo vibration testing shall be conducted at each of two temperatures: 63°C ± 1.7°C (145°F ± 3°F) and -5 1°C ± 1.7°C (-60°F ± 3°F). One hundred and sixty cartridges for each temperature environment shall be conditioned for a minimum of 12 hours prior to loose cargo testing.



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The packaging shall be visually inspected after all vibration, and any damage shall be noted and photographed. The packaging shall be opened and the test cartridges shall be inspected for damage. Sixty cartridges shall be removed from each temperature environment and subjected to function and casualty testing. The remaining 160 cartridges shall be subjected to the 1.5 meter drop test.

c. 1.5 Meter unpackaged drop (80 rounds). Testing shall be conducted with cartridges packed in accordance with packaging provisions of the contract, and in accordance with ITOP 4-2-602, Appendix C 1.5 Meter Drop, except as clarified and expanded below.

A sample of 54 cartridges from the remaining 80 cartridges from each temperature environment shall be removed from their packages and subjected to the individual bare cartridge drops. The drop equipment and impact surface shall be the same as described in paragraph 4.15.3. The 54 cartridges from each temperature environment shall be subdivided into subgroups of 9 cartridges each, which will then be dropped once in one of the following orientations: nose down, base down, 45° nose down, 45° base down, and side down. In addition, one subgroup shall be subjected to one drop in each of the five orientations.

d. 2.1-Meter packaged drop test (240 rounds). The 2.1-meter packaged drop test shall be conducted with cartridges packed in accordance with packaging provisions of the contract, and in accordance with ITOP 4-2-602, Appendix A 2.1 Meter Drop, except as classified and expanded below.

One hundred twenty cartridges shall be temperature conditioned to  $63^{\circ}\text{C} \pm 1.7^{\circ}$  ( $145^{\circ}\text{F} \pm 3^{\circ}$ ) for a minimum of 12 hours prior to being drop tested. Another one hundred twenty cartridges shall be temperature conditioned to  $-51^{\circ}\text{C} \pm 1.7^{\circ}$  ( $-60^{\circ}\text{F} \pm 3^{\circ}$ ) for a minimum of 12 hours prior to being drop tested.

At the completion of the conditioning period, each package shall be subjected to three drops, one in each of the following impact orientations: (1) bottom down; (2) left side down; (3) right side down. The drops shall be made from a quick-release hook attached to an overhead hoist, at ambient temperature conditions. The test items shall be allowed to fall freely onto an armor plate, 76.2mm thick, supported by 45 7mm of crushed stone.

The packages shall be visually examined after each drop, and any damage shall be noted and photographed. The packages shall then be opened and the test cartridges examined for damage. Sixty cartridges from each temperature environment and subjected to function and casualty firing. The remaining 160 cartridges from each temperature environment shall be repacked, using new wirebound boxes, and prepared for the Loose Cargo (Packaged) Vibration test.

4.7.4 12.2 Meter drop verification. Six hundred and forty cartridges shall be subjected to the 12.2 meter drop test in accordance with drop tests for munitions. The test shall be performed in accordance with ITOP 4-2-601. Three hundred and twenty cartridges each shall be tested at  $49^{\circ}\text{C} \pm 3^{\circ}$  ( $120^{\circ}\text{F} \pm 5^{\circ}$ ) and at  $-32^{\circ}\text{C} \pm 3^{\circ}$  ( $-25^{\circ}\text{F} \pm 5^{\circ}$ ). The cartridges shall be packed in accordance with drawing 9396206: 160 cartridges per M2A1 ammunition box and 2 M2A1 ammunition boxes per wirebound box. The cartridge shall be safe to handle and dispose upon the completion of this test.



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4.7.5 Temperature and humidity verification. Testing for high temperature and humidity functioning shall be performed in accordance with TOP 4-2-016, Temperature-Humidity.

4.7.6 Long term storage verification. Testing for long term storage shall be conducted in accordance with MIL-STD-810, High Temperature, at a constant extreme hot temperature and with MIL-STD-810, Low Temperature, at a constant extreme cold temperature.

4.7.7 Salt fog. Testing for salt fog shall be conducted in accordance with MIL-STD-810, Salt Fog. The test ammunition shall then be tested for function and casualty the using Mossberg Model 590 and Remington Model 870. If there are any functioning failures, the lot shall be rejected. After firing, the cartridges shall be examined for detects in accordance with TABLE VIII.

4.7.8 Thermal shock. Testing for thermal shock shall be performed in accordance with MIL-STD-810, Temperature Shock. The cartridges shall be placed inside an environmental chamber set at  $-57^{\circ}\text{C}$  ( $-70^{\circ}\text{F}$ ) for initiation of the test sequence. At the completion of the first 4-hour cycle, the cartridges shall be transferred to a high temperature chamber set at  $71^{\circ}\text{C}$  ( $160^{\circ}\text{F}$ ) for a 4-hour cycle. This process shall be repeated until six cycles (48 hours of exposure) are completed. The cartridges will be visually inspected for any signs of deterioration. The cartridges will then be stored under ambient condition for 48 hours. The cartridges will then be visually inspected for any signs of corrosion. The cartridges shall be function fired from the Mossberg 590 and Remington 870 and the muzzle velocity shall be measured.

4.7.9 Noise. The sound pressure level shall be tested with an approved decibel meter placed  $8 \pm 1$  inches to the right of a spot on the weapon centerline that is  $6 \pm 1$  inches to the rear of the rear sight. Both the weapon and the decibel meter shall be placed approximately 5 feet above the ground. Ten cartridges shall be fired and the peak sound pressure and the B-duration limits shall be observed for each round in accordance with Sound level measurements test operating procedures and MIL-STD-1474.

4.8 Support and ownership requirements.

4.8.1 Ammunition lot number. Visually verify that an ammunition lot number has been assigned to each lot of 12 Gauge breaching ammunition in accordance with MIL-STD-1168.

4.8.2 Energetic material qualification. Objective evidence that the Army Qualification Authority has qualified all energetic materials shall be examined (see 6.9 & 6.2).

4.8.3 Energetic material compatibility. Compliance with the Energetic materials compatibility requirements shall be validated during the design verification test. Compatibility tests shall be conducted in accordance with MIL-STD-650, Reactivity Test or MIL-STD-286C, Reactivity Test. Compatibility is demonstrated when results reflect negligible reactivity.

4.8.4 Propellant stability. Propellant stability tests shall be conducted in accordance with the test procedures listed in TABLE IX. Stability is demonstrated when results comply with the requirements listed below.

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TABLE IX. Propellant stability tests

<u>Test</u>	<u>Reference Document</u>	<u>Test Procedure Description</u>	<u>Requirement</u>
Heat	MIL-STD-286	Heat Test (404.1.2)	For single base propellants -Methyl violet paper shall not change to salmon pink in less than 40 minutes, and the sample shall not explode in less than 5 hours at 134.5°C.
			For double base propellants -Methyl violet paper shall not change to salmon pink in less than 40 minutes, and no fumes given off less than 1 hour at 120°C.
Storage/ Degradation	MIL-STD-286	Surveillance (407.1)	No fumes in less than 30 days of storage at 65.5°C.

4.8.5 Final hazard classification. Compliance with the FHC requirements shall be validated during design verification. Tests shall be in accordance with TB 700-2. The following tests, as defined in TB 700-2, UN Test Series 6 shall be used:

- a. Single package test,
- b. Stack test
- c. External fire test
- d. Thermal stability
- e. 12 meter drop test

4.8.6 Reliability. The test shall be performed in accordance TOP 3-2-045, Endurance Test. A total of 1200 cartridges shall be fired using two Mossberg model No. 590 and two Remington Model 870. The weapons shall be cleaned and lubricated before firing at each temperature. Weapons shall have a total chamber and magazine capacity of five cartridges minimum. All weapons shall be loaded to capacity and the test shall be performed until the total test sample quantity is reached. The cartridges shall be tested at hot, cold, and ambient conditions. To be acceptable, in firing of 1200 cartridges, there shall be no more than 60 stoppages in all weapons or 25 stoppages in any one weapon. This test shall be performed simultaneously with the function and casualty test.

4.8.7 Explosive ordnance disposal (EOD). When specified, the critical design characteristics shall be provided and sent to US Army ARDEC, Picatinny, NJ 07806-5000, Attention: AMSRD-AAR-AEX, for evaluation.

4.8.8 Workmanship. All test cartridges shall be visually inspected for the defects listed in TABLE V. The criteria for grading defects shall be in accordance with MIL-STD-636.

## 5. PACKAGING.

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by

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DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Service or Defense Agency, or within the military service's system command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

## 6. NOTES

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

6.1 Intended use. These cartridges are military unique and are intended for use in US military 12 Gage shotguns.

a. They must be capable of breaching solid wood doors, by causing the door lock mechanism, hinge or padlock to disconnect and the door to open. They must do this with no projectile, projectile fragment, nor target shrapnel blowback upon target impact.

b. They must meet the military's propellant stability and shelf life storage requirements of 5 years, which exceeds commercial industries normal requirements.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number and date of this specification, and of all reference documents cited in Section 2 and referenced in Section 6.
- b. Requirements for submission of design verification samples.
- c. Requirements for submission of first article samples.
- d. Requirements for submission of conformance samples.
- e. Requirement and provisions for submission of test data and certification as required.
- f. Requirement and provisions for submission and approval of acceptance test equipment and test procedures
- f. Certificate of conformance for each lot of ammunition.
- g. Requirements for Ammunition Lot Numbering.
- h. Special packaging requirements may apply to these cartridges. Contact AMSRD-AAR-AEM-I for guidance and provision of applicable drawings (COAI 12991886 and P&M 93962060).
- i. Certificate of conformance that the projectile will not contain any toxic heavy metals or other hazardous materials (see 6.14)

6.5 Submission of alternative conformance provisions. Alternative conformance provisions require Government evaluation/approval as directed by the contracting activity.

6.6 Army-type designator. The appearance of type designators in contracts, invitation to bid, specifications, drawings, etc. does not in itself constitute official type designation assignment. Only those type designators approved and issued in full accordance with the Type

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Designator assignment provisions of MIL-STD-1464 will be considered officially assigned. Government direction for appropriate nomenclature will be provided following Design Verification.

6.7 Sound level measurements. Both Sound level measurement test operating procedures and MIL-STD-1474 provide guidance on how to measure sound levels and how to calculate B-durations.

6.8 Final hazard classification. If the Final Hazard Classification on record was based on government packaging drawings, it may be necessary to include those packaging drawings in the contract to ensure continued legal transportation. Determination should be made by AMSRD-AAR-QEM-S.

6.9 Energetic material qualification information. Qualification of energetic materials by the Army Qualification Authority requires demonstration that the energetic material meets the requirements of AOP-7 and STANAG 4170.. This task is addressed in the statement of work in the contract. Points of contact for the Army Qualification Authority can be obtained from Commander, US Army ARDEC, ATTN: AMSRD-AAR-QEM-C, Picatinny, NJ 07806-5000.

6.10 Temperature. Temperature conditions for this specification are as follows:

Extreme Cold:  $-65^{\circ}\text{F} \pm 5.4^{\circ}\text{F}$  ( $-54^{\circ}\text{C} \pm 3^{\circ}$ )

Cold:  $-25^{\circ}\text{F} \pm 5.4^{\circ}\text{F}$  ( $-32^{\circ}\text{C} \pm 3^{\circ}$ )

Ambient:  $68^{\circ}\text{F} \pm 5.4^{\circ}\text{F}$  ( $20^{\circ}\text{C} \pm 3^{\circ}$ )

Hot:  $120^{\circ}\text{F} \pm 5.4^{\circ}\text{F}$  ( $49^{\circ}\text{C} \pm 3^{\circ}$ )

Extreme Hot:  $160^{\circ}\text{F} \pm 5.4^{\circ}$  ( $71^{\circ}\text{C} \pm 3^{\circ}$ )

The ammunition should be conditioned at the respective temperatures for not less than 4 hours. Unless otherwise specified, the conditioned ammunition should be fired at ambient temperature. The conditioned ammunition (other than ambient) will not be exposed to ambient temperature conditions for more than 5 minutes unless specified. If the conditioned ammunition is exposed for specified time, the ammunition will be reconditioned for a minimum of 4 hours.

6.11 Critical Characteristics Justification Matrix. This matrix contains brief descriptions of the effects of critical defects that can occur in the breaching round ammunition.

<u>CRITICAL DEFECT</u>	<u>RATIONALE</u>
<b>Firing Defect:</b> Projectile in bore	Firing the next round would result in an excessive amount of pressure build-up that could blow the receiver apart and cause injury to the shooter. The weapon could even experience disassembly from hot propellant gas and produce shrapnel. Blockage in the barrel could send hot gas out through the breech and into the users face. On most guns the bolt being closed after the shot will not completely seal off the gas. Gas could also vent out the back through the clearance between the bolt and the receiver. Some of this gas could also escape from the ejection port.

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<b>Firing Defect:</b> Misfire – Due to contaminated propellant	Contaminated propellant weight could cause a cartridge to fail to extract, because of the escaped hot propellant gases through the breach. It could cause weapon damage or injury to the shooter. This defect can not be checked during production and after a misfire could show an indication of a defective lot.
<b>Firing Defect:</b> Misfire – Due to low propellant	Low propellant weight could cause a cartridge to fail to extract, because of the escaped hot propellant gases through the breach. It could cause weapon damage or injury to the shooter.
1.) Bottom rim split	Escape of hot propellant gases through breach could cause injury to shooters face or damage the weapon.
2.) Low propellant weight	Low propellant weight could cause a cartridge to fail to extract, because of the escaped hot propellant gases through the breach. It could cause weapon damage or injury to the shooter.
3.) Primer above flush	If the weapon is dropped or mishandled, the bolt may slam into the primer with enough force to set it off. This could cause injury or death to either the shooter or personnel in the surrounding area.
4.) Perforated or split case with propellant loss	Low propellant weight could cause a cartridge to fail to extract resulting in a projectile in bore. This in turn can cause the escaped hot propellant gases to return through the breach. It could cause weapon damage or injury to the shooter.

6.12 Subject term (keyword) listing.

MOUT (Military Operations in Urban Terrain)

12 Gage Shotgun

Breaching ammunition

12 Gauge Shotshell

6.13 Function and Casualty. When referring to casualty for this requirement it will be interpreted as the loss, destroying, or damaging of the ammunition.

6.14 EPA. A list of toxic heavy metals and other hazardous materials is contained in EPA 33/50 Program - The Final Record; Box 1 - 17 Targeted Chemicals. Copies of the publication are available from <http://www.epa.gov> or United States Environmental Protection Agency, (7408), Washington, DC 20460.

Custodian:  
Army-AR

Preparing activity:  
Army-AR  
(Project 1305-2008-008)

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <http://assist.daps.dla.mil>