INCH-POUND

MIL-PRF-71139A (AR)
22 October 2007
SUPERSEDING
MIL-C-71139 (AR)
04 January 1994

PERFORMANCE SPECIFICATION

CARTRIDGE, 25MM; HIGH EXPLOSIVE INCENDIARY WITH TRACE (HEI-T), M792

Reactivated after 1 September 2006 and may be used for new and existing designs and acquisitions

This specification is approved for use by the US 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 describes the performance requirements and verification procedures for the CARTRIDGE, 25MM, high explosive incendiary with trace (HEI-T), M792 (see 6.1).

1.2 Army-type designator. The Army-type designator (M792) referenced in this specification is of Army origin and does not reflect a particular design (see 6.17).

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 cited 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 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).

INTERNATIONAL STANDARDIZATION AGREEMENTS

AOP -7	Manual of Data Requirements and Tests for the Qualification of Explosive Materials for Military Use
STANAG 4382	Slow Heating, Munitions Test Procedures

Comments, suggestions, or questions on this document should be addressed to: Commander, US Army ARDEC, ATTN: AMSRD-AAR-AIS-SS, Picatinny, New Jersey 07806-5000, or ardec-stdzn@pica.army.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIT online database at http://assist.daps.dla.mil.

AMSC N/A FSC: 1305

FEDERAL STANDARDS

FED-STD-595/34079	Green, Flat or Lusterless
FED-STD-595/34082	Green, Flat or Lusterless
FED-STD-595/34088	Green, Lusterless (Flat)
FED-STD-595/34096	Green, Flat or Lusterless
FED-STD-595/31158	Red, Lusterless
FED-STD-595/33538	Yellow Lusterless

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-331	Fuze and Fuze Components, Environmental and Performance Tests for
MIL-STD-651	Visual Inspection Standards for 20mm Ammunition and Components
MIL-STD-709	Ammunition Color Coding
MIL-STD-810	Environmental Engineering Considerations and Laboratory Tests
MIL-STD-1168	Ammunition Lot Numbering and Ammunition Data Card
MIL-STD-1316	DOD Design Criteria Standard, Fuze Design, Safety Criteria For
MIL-STD-1916	DOD Preferred Method for Acceptance of Product
MIL-STD-2105	Hazard Assessment Tests for Non-Nuclear Munitions

(Copies of the above specifications, standards, and handbooks are available from the Standardization Documents Order Desk, 700 Robbins Avenue, Bldg. 4D, Philadelphia, PA 19111-5094 or online at http://assist.daps.dla.mil.)

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 are those cited in the solicitation.

DEPARTMENT OF DEFENSE TECHNICAL BULLETIN

TB 700-2	Department of Defense Explosives Hazard Classification Procedures

(Copies of the above document are available from Chairman, Department of Defense Explosives Safety Board, Room 856C, Hoffman Building 1, 2461 Eisenhower Avenue, Alexandria, VA 22331-0600 or online at https://www3.dac.army.mil.)

US ARMY AVIATION AND MISSILE COMMAND

MIS36602	Missile Specification Critical Item Product Function Specification for the Bradley Eyesafe Laser Rangefinder Integrated Sight Unit 18876-13492497 of the Bradley Fighting Vehicle TOW 2 Subsystems
MIS-PRF-52925	Performance Specification for the Bradley Fighting Vehicle Subsystem (M2A3/M3A3) Improved Bradley Acquisition Subsystem (IBAS)

(Copies of these documents are available from the Program Executive Office, Tactical Missiles, Project Manager, CCAWS, Project Office, SFAE-MSL-CC-AT, Redstone Arsenal, AL 35898-5710.)

US ARMY PAMPHLETS

DA PAM 385-63	Range Safety

FT 25-A-2	Firing Tables, Cannon, 25MM Gun, M242 on Infantry Fighting Vehicle, M2 and Cavalry Fighting Vehicle, M3, Firing Cartridge, APDS-T, M791, Cartridge, HEI-T-M792, Cartridge, TP-T, M793, Cartridge, M910

(Copies of the above document are available from the Army Publishing Directorate at http://dol.hqda.pentagon.mil/ptclick/index.aspx)

US ARMY DEVELOPMENTAL TEST COMMAND

INTERNATIONAL TEST OPERATING PROCEDURES

ITOP 1-2-601	Laboratory Vibration Schedules
ITOP 4-2-602	Rough Handling Tests
ITOP 4-2-805	Projectile Velocity and Time of Flight Measurements

TEST OPERATING PROCEDURES

TOP 1-2-608	Sound Level Measurements
TOP 2-2-614	Toxic Hazards Tests for Vehicles and Other Equipment
TOP 3-2-045	Automatic Weapons, Machineguns, Hand and Shoulder Weapons
TOP 4-2-827	Time of Flight and Ballistic Coefficients

(Copies of 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.)

ARDEC PUBLICATIONS

AS12013566	25MM Ammunition Ballistic Test Methods
AMCR 715-505	Ammunition Ballistic Acceptance Test Methods, Volume 8, Test Procedures for 20mm Cartridges

(This publication is available from US Army ARDEC, AMSRD-AAR-QAC, Picatinny, NJ 07806-5000.)

ARDEC DRAWINGS

9391400	Interface Control Drawings, Max Profile and Alignment, Cartridge, M792, M793 and HPT
12013213	Link Assembly, 25mm, M28
12013689	Interface Control Drawing for Cartridges TP-T M793, HEI-T M792 and HPT
12524001	Barrel Assembly
12524004	Brake, Muzzle
12524502	Barrel, Mann 25mm
12524507	Barrel Assembly, Nitride Bore
12524520	Barrel Assembly, Chrome Bore
12910127	Ballistic Piezoelectric Transducer

(Copies of these drawings may be requested on line at Drawing-Request@pica.army.mil or from US Army ARDEC, AMSRD-AAR-AID-TD, Picatinny, NJ 07806-5000.)

2.3 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.

ASTM INTERNATIONAL

ASTM D1729 Standard Practice for Visual Appraisal of Colors and Color Diffusely-Illuminated Opaque Materials

(Copies of this document are available from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or www.astm.org.)

2.4 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 Design verification. When specified (see 6.2), a sample of M792 cartridges shall be subjected to design verification in accordance with 4.2.

3.2 First article. When specified (see 6.2), a sample of M792 cartridges shall be subjected to first article inspection in accordance with 4.3.

3.3 Conformance inspection. For lot acceptance (see 6.2), a sample of M792 cartridges shall be subjected to conformance inspection in accordance with 4.4.

3.4 Interface and interoperability.

3.4.1 Weapon interface. The cartridge configuration shall conform to drawing 12013689.

3.4.2 Projectile torque. The projectile shall be capable of withstanding a minimum torque of 30 inch-pounds without rotational movement with respect to the cartridge case.

3.4.3 Projectile extraction. The tensile force necessary to extract the projectile from the cartridge case shall be between 2000 and 4100 pounds inclusive.

3.4.4 Noise. The average peak sound pressure level (P, decibels) and pulse “B” duration (t, milliseconds) shall be limited in intensity and duration such that the following equation can be satisfied when measured 0.46 meter left of the weapon breech:

$$P - 6.64\,[\log(200/t)] \leq 167\ \text{dB}$$

In addition, the pulse “B” duration shall not exceed 200 milliseconds.

3.4.5 Toxic fumes. The cartridge shall not produce toxic fumes (as defined in TOP 2-2-614) in excess of the concentrations produced by fielded (control) M793 Target Practice with Trace ammunition.

3.4.6 Primer sensitivity. The mean critical height (H) plus five standard deviations for the sample primers shall not exceed 19 inches. The mean critical height minus two standard deviations for the sample primers shall not be less than 2 inches.

3.5 Operating requirements.

3.5.1 Chamber pressure. The average plus 3.0 standard deviations of chamber pressure shall not exceed 454 MPa when the cartridge is conditioned at 21°C. The average plus 2.0 standard deviations shall not exceed 496 MPa when the cartridge is conditioned at -46° and 63°C. No individual value shall exceed 496 MPa during any testing.

3.5.2 Action time. The action time of the cartridge shall not exceed 6.0 milliseconds.

3.5.3 Function, casualty and metal parts security. The cartridge shall function without casualty while maintaining metal parts security. Cartridges and subcomponent parts shall exhibit integrity during weapon cycling, chambering, firing, and in ballistic flight.

3.5.4 Dispersion. The standard deviation of projectile impacts in both the horizontal and the vertical directions shall be no greater than 0.77 mils when fired from a Mann barrel and no greater than 0.87 mils when fired at a rate of 100 shots per minute (spm) from a M242 autogun.

3.5.5 Trajectory. The cartridge shall have a projectile trajectory within 10% of the trajectory identified for the M792 in FT25-A-2 throughout a range of 3000 meters.

3.5.5.1 Muzzle velocity. The average muzzle velocity of the projectile minus 2.0 standard deviations shall be no less than the minimum allowed velocity to achieve the trajectory match requirement when the cartridge is conditioned at 21°C and the velocity standard deviation of the sample shall not exceed 13 meters per second.

3.5.6 Surface danger zone. The cartridge shall comply with the M792 surface danger zone stated in DA PAM 385-63 (see 6.19).

3.5.7 Projectile trace. The projectile shall provide a continuous visible trace (both thermal and spectral) from the muzzle of the weapon to a range of at least 2000 meters when viewed through the Bradley Fighting System (BFVS) Integrated Sight Unit (ISU) or IBAS.

3.5.8 Projectile non-arming. The projectile shall not function upon impact with a 0.063 inch nominal thickness 2024-T3 aluminum plate at $0^{o} \pm 10^{o}$ obliquity at a distance from the muzzle of the weapon of no less than the safe separation distance of the detonated projectile.

3.5.9 Projectile impact function. The projectile shall function upon impact with a 0.063 inch nominal thickness 2024-T3 aluminum plate at $0^{o} \pm 10^{o}$ obliquity, at a distance of 200 meters from the muzzle.

3.5.10 Projectile self-destruct function. The projectile shall self destruct after 3000 meters of free flight.

3.5.11 Smoke. Any smoke produced from firing the M792 shall not impede the shooter's vision from the gun position after firing a 10-round burst from the M242 autogun.

3.5.12 Flash. The cartridge shall not exhibit any secondary muzzle flash that exceeds the following: a brightness of 6,000 candles or a duration of 3 milliseconds. The cartridge shall not exhibit any breech flash.

3.5.13 Cook off. The cartridge shall not cook off when left chambered in a hot gun tube for 30 minutes.

3.5.14 HEI charge cook off. The cartridge propellant shall cook off prior to cook off of the high explosive charge when left chambered in a hot gun tube for 30 minutes (see 6.19).

3.5.15 Fragmentation. The lethal area of a projectile surface burst shall be 6 to 14 square meters against personnel using lethal area calculation procedures, 30-second defense situation, and man targets in the prone position with winter uniform at 1000 to 3000 meters.

3.5.16 Incendiary. Functioning of the projectile shall produce an incandescent flash sufficiently intense and sustained to cause combustion of flammable liquids and other readily ignitable materials.

3.5.17 Fuzing system. The cartridge fuzing system shall comply with the requirements of MIL-STD-1316 and MIL-STD-331 and shall be approved by the Army Fuze Safety Review Board.

3.6 Environmental requirements.

3.6.1 Waterproofness. The cartridge shall not allow water entry into the cartridge case, projectile body or fuze.

3.6.2 Ruggedness. The cartridge shall withstand the rigors of transportation and rough handling.

3.6.3 Salt fog. The cartridge shall show no evidence of degradation or corrosion after exposure to the salt fog environment.

3.6.4 Humidity. The cartridge shall show no evidence of degradation or corrosion after being subjected to the humidity environment.

3.6.5 Extreme temperature/long term storage. The cartridge shall show no evidence of degradation after being subjected to the extreme temperature/long term storage environment.

3.6.6 Temperature shock. The cartridge shall show no evidence of degradation after being subjected to temperature conditioning cycling.

3.7 Support and ownership.

3.7.1 Final hazard classification (FHC). The cartridge shall comply with the following hazard classification when packaged in accordance with the requirements of the contract:

DOD Hazard Class/Div/SCG:	1.2.2E
DOT Hazard Class:	1.2E
UN Serial Number:	0321
Net Explosive Weight:	<0.30 lbs

3.7.2 Energetic material qualification. Energetic materials (such as explosives, propellants, and pyrotechnics) shall be qualified for military use by the Army Qualification Authority (see 6.8).

3.7.3 Energetic materials compatibility. All energetic materials (such as explosives, propellants, and pyrotechnics) utilized shall be compatible with all combinations of directly contacting energetic and non-energetic materials. In addition, they shall be compatible with all combinations of materials that have the potential for contact in the system life cycle (such as manufacturing environment and storage).

3.7.4 Propellant flame temperature. Propellant flame temperature shall not exceed 3100K.

3.7.5 Ammunition lot numbering. Ammunition lot numbers shall be assigned in accordance with MIL-STD-1168. All markings and stampings shall be neat and legibly defined.

3.7.6 Insensitive munitions. The M792 cartridge shall comply with the DOD insensitive munition requirements of MIL-STD-2105 excluding spall impact test.

3.7.7 Cartridge color. The color of the cartridge case shall be olive drab green compliant within the range of FED-STD-595/34079, FED-STD-595/34082, FED-STD-595/34088, and FED-STD-595/34096. The color of the projectile shall be yellow (FED-STD-595/33538) with a 0.50 ± .05 inch circumferential red stripe (FED-STD-595/31158) at the forward edge of the ogive in accordance with MIL-STD-709.

3.7.8 Marking. Cartridge and projectile markings shall be visible, clear and remain legible during normal life cycle handling. The cartridge markings shall be located no further than 1.19 inches maximum above the base of the cartridge case. Cartridge and lot number marking characters shall be 0.18 ± .03 inch high and the color shall be black. The cartridge lot number and marking CTG, 25MM, HEI-T, M792 shall be placed .06 ± .03 inch apart with the lot number below the nomenclature. The HEI-T M792 and projectile lot number marking shall be located on the projectile in characters 0.125 ± .03 inch high and the color shall be black. Location on projectile is optional. All marking shall be placed circumferentially and oriented such that they are upright when the cartridge is base down.

3.7.9 Conformance to baseline. The cartridge shall be built in accordance with the verified design.

3.7.10 Workmanship. All cartridge parts and assemblies shall be clean, free of burrs, sharp edges, unblended radii, surface defects, chips, dirt, grease, oil, corrosion products, and foreign matter, etc. that may impair proper functioning. Exterior surface coatings shall be continuous. Acceptable and unacceptable visual and physical defect criteria are defined in MIL-STD-651.

4. VERIFICATION

TABLE I. Requirement/verification cross reference matrix

METHOD OF VERIFICATION
N/A - Not applicable
1 - Analysis
2 - Demonstration
3 - Examination
4 - Test

CLASSES OF VERIFICATION
A - Design verification
B - First article
C - Conformance

Section 3 Requirement		Section 4 Method	Verification Methods					Verification Class		
			N/A	1	2	3	4	A	B	C
3.4.1	Weapon interface	4.6.1.1			X			X	X	X
3.4.2	Projectile torque	4.6.1.2					X	X	X	X
3.4.3	Projection extraction	4.6.1.3					X	X	X	X
3.4.4	Noise	4.6.1.4					X	X		
3.4.5	Toxic fumes	4.6.1.5					X	X		
3.4.6	Primer sensitivity	4.6.1.6					X	X	X	X
3.5.1	Chamber pressure	4.6.2.1					X	X	X	X
3.5.2	Action time	4.6.2.1					X	X	X	X
3.5.3	Function and casualty, metal parts security	4.6.2.2					X	X	X	X
3.5.4	Dispersion	4.6.2.3					X	X	X	X
3.5.5	Trajectory	4.6.2.4		X			X	X		
3.5.6	Surface danger zone	4.6.2.5		X			X	X		
3.5.7	Projectile trace	4.6.2.6					X	X	X	X
3.5.8	Projectile non-arming	4.6.2.7					X	X	X	X
3.5.9	Projectile impact function	4.6.2.7					X	X	X	X
3.5.10	Projectile self-destruct function	4.6.2.7					X	X	X	X
3.5.11	Smoke	4.6.2.8					X	X		
3.5.12	Flash	4.6.2.9					X	X		
3.5.13	Cook off	4.6.2.10					X	X		
3.5.14	HEI charge cook off	4.6.2.11					X	X		
3.5.15	Fragmentation	4.6.2.12		X			X	X		
3.5.16	Incendiary	4.6.2.13					X	X		
3.5.17	Fuzing system	4.6.2.14					X	X		
3.6.1	Waterproofness	4.6.3.1					X	X	X	X
3.6.2	Ruggedness	4.6.3.2					X	X	X	
3.6.3	Salt fog	4.6.3.3					X	X	X	
3.6.4	Humidity	4.6.3.4					X	X	X	
3.6.5	Extreme temperature/long term storage	4.6.3.5					X	X		
3.6.6	Temperature shock	4.6.3.6					X	X		
3.7.1	Final hazard classification	4.6.4.1					X	X		
3.7.2	Energetic materials qualification	4.6.4.2			X			X		
3.7.3	Energetic materials compatibility	4.6.4.3					X	X		
3.7.4	Propellant flame temperature	4.6.4.4		X				X		
3.7.5	Ammunition lot numbering	4.6.4.5				X		X	X	X
3.7.6	Insensitive munitions	4.6.4.6					X	X		
3.7.7	Cartridge color	4.6.4.7				X		X	X	X
3.7.8	Marking	4.6.4.8				X		X	X	X
3.7.9	Conformance to baseline	4.6.4.9				X		X	X	X
3.7.10	Workmanship	4.6.4.10				X		X	X	X

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

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

4.1.1 Verification conditions. Unless otherwise specified, all verifications shall be performed in accordance with the test methods and conditions specified in section 4.6.

4.1.2 Classification of characteristics. For examinations and tests cited herein or when required by contract; critical, major, and minor characteristics are defined in MIL-STD-1916.

4.1.3 Inspection lot formation. Lot formation shall be in accordance with MIL-STD-1916. In addition, propellant and fuzes shall be restricted to one lot. All other subcomponents comprising the M792 shall be restricted to one lot interfix.

4.2 Design verification. When specified in the contract, a sample of M792 cartridges shall be subjected to design verification and test quantities in accordance with Table II.

4.2.1 Design verification rejection. If any item of the sample fails to comply with the design verification requirements, the sample shall be rejected, unless otherwise specified in Table II notes (see 6.6).

TABLE II. Design verification

Examination or Test 1/	**Conformance Criteria**		**Requirement Paragraph**	**Inspection Method**
	Sample	**Acc/Rej**		
Examination for defects	Table V	Table V	3.4.1, 3.7.5, 3.7.7, 3.7.8, 3.7.9, 3.7.10	4.6.1.1, 4.6.4.5, 4.6.4.7, 4.6.4.8, 4.6.4.9, 4.6.4.10
Projectile torque 2/	20	0/1	3.4.2	4.6.1.2
Projectile extraction 2/	20	0/1	3.4.3	4.6.1.3
Noise			3.4.4	4.6.1.4
21° ± 3°C	10	N/A		
Toxic fumes			3.4.5	4.6.1.5
21° ± 3°C	10	N/A		
Primer sensitivity 15/	14/	14/	3.4.6	4.6.1.6
Chamber pressure 3/			3.5.1	4.6.2.1
-46° ± 3°C 9/	50	N/A		
-46° ± 3°C	50	N/A		
21° ± 3°C	50	N/A		
63° ± 3°C	50	N/A		
Action time 3/			3.5.2	4.6.2.1
-46° ± 3°C 9/	50	0/1		
-46° ± 3°C	50	0/1		
21° ± 3°C	50	0/1		
63° ± 3°C	50	0/1		
Function and casualty, metal parts security			3.5.3	4.6.2.2
-46° ± 3°C	100	4/		
21° ± 3°C	100	4/		
63° ± 3°C	100	4/		
Dispersion			3.5.4	4.6.2.3
Mann barrel				4.6.2.3.1
-32° ± 3°C	40	N/A		
21° ± 3°C	40	N/A		
52° ± 3°C	40	N/A		
M242 autogun LR				4.6.2.3.2
-32° ± 3°C	40	N/A		
21° ± 3°C	40	N/A		
52° ± 3°C	40	N/A		
Trajectory	20	N/A	3.5.5	4.6.2.4
Muzzle velocity 3/			3.5.5.1	4.6.2.4.1
21° ± 3°C	50	N/A		
Surface danger zone	170	N/A	3.5.6	4.6.2.5
Projectile trace (burn time/range)			3.5.7	4.6.2.6.1
-32° ± 3°C	45	0/1		
21° ± 3°C	45	0/1		
52° ± 3°C	45	0/1		
Projectile trace (visibility) 7/			3.5.7	4.6.2.6.2
A2ODS SS day clear	20	0/1		
A2ODS SS white/black hot	20	0/1		
A2ODS LR day clear	20	0/1		
A2ODS LR white/black hot	20	0/1		

TABLE II. Design verification (continued)

Examination or Test 1/	Conformance Criteria		Requirement Paragraph	Inspection Method
	Sample	Acc/Rej		
Projectile trace (visibility) continued 7/			3.5.7	4.6.2.6.2
A3 SS day clear	20	0/1		
A3 SS white/black hot	20	0/1		
A3 LR day clear	20	0/1		
A3 LR white/black hot	20	0/1		
Projectile non-arming			3.5.8	4.6.2.7
-46° ± 3°C	45	0/1		
21° ± 3°C	45	0/1		
63° ± 3°C	45	0/1		
Projectile impact function			3.5.9	4.6.2.7
-46° ± 3°C	45	0/1		
21° ± 3°C	45	0/1		
63° ± 3°C	45	0/1		
Projectile self destruct function			3.5.10	4.6.2.7
-46° ± 3°C	45	0/1		
21° ± 3°C	45	0/1		
63° ± 3°C	45	0/1		
Smoke			3.5.11	4.6.2.8
-32° ± 3°C	10	N/A		
21° ± 3°C	10	N/A		
52° ± 3°C	10	N/A		
Flash			3.5.12	4.6.2.9
-32° ± 3°C	10	0/1		
21° ± 3°C	10	0/1		
52° ± 3°C	10	0/1		
Cook off 12/	3	0/1	3.5.13	4.6.2.10
HEI charge cook off 17/	3	0/1	3.5.14	4.6.2.11
Fragmentation	9	0/1	3.5.15	4.6.2.12
Incendiary 18/	9	0/1	3.5.16	4.6.2.13
Fuzing system	N/A	N/A	3.5.17	4.6.2.14
Waterproofness			3.6.1	4.6.3.1
21° ± 3°C	20	0/1		
Ruggedness 13/			3.6.2	4.6.3.2
-46° ± 3°C	240	N/A		
63° ± 3°C	240	N/A		
Salt fog	30	4/	3.6.3	4.6.3.3
Humidity	30	4/	3.6.4	4.6.3.4
Extreme temperature/long term storage 13/			3.6.5	4.6.3.5
-46° ± 3°C	30	4/		
63° ± 3°C	30	4/		
Temperature shock 13/	30	N/A	3.6.6	4.6.3.6
Final hazard classification 13/	1020	N/A	3.7.1	4.6.4.1
Energetic material qualification	N/A	N/A	3.7.2	4.6.4.2
Energetic material compatibility	N/A	N/A	3.7.3	4.6.4.3
Propellant flame temperature	N/A	N/A	3.7.4	4.6.4.4
Insensitive munitions 13/	420	N/A	3.7.6	4.6.4.6

See notes after Table IV.

4.3 First article inspection. When specified in the contract, a sample of M792 cartridges shall be subjected to first article inspection and first article quantity in accordance with Table III.

4.3.1 Inspection to be performed. The first article assemblies, components and test specimens shall be subjected to any or all of the examinations and tests specified in Table III.

4.3.2 First article rejection. If any item of the sample fails to comply with the first article inspection requirements, the sample shall be rejected, unless otherwise specified in Table III notes (see 6.6).

TABLE III. First article inspection

Examination or Test 1/	**Conformance Criteria**		**Requirement Paragraph**	**Inspection Method**	**Classification**
	Sample	**Acc/Rej**			
Examination for defects	Table V	Table V	3.4.1, 3.7.5, 3.7.7, 3.7.8, 3.7.9, 3.7.10	4.6.1.1, 4.6.4.5, 4.6.4.7, 4.6.4.8, 4.6.4.9, 4.6.4.10	Table V
Projectile torque 2/	20	0/1	3.4.2	4.6.1.2	Major
Projectile extraction 2/	20	0/1	3.4.3	4.6.1.3	Major
Primer sensitivity 15/	14/	14/	3.4.6	4.6.1.6	Critical/ Major
Chamber pressure 3/			3.5.1	4.6.2.1	Major
-46° ± 3°C	50	N/A			
21° ± 3°C	50	N/A			
63° ± 3°C	50	N/A			
Action time 3/			3.5.2	4.6.2.1	Major
-46° ± 3°C	50	0/1			
21° ± 3°C	50	0/1			
63° ± 3°C	50	0/1			
Function and casualty, metal parts security			3.5.3	4.6.2.2	Table VI
-46° ± 3°C	75	4/			
21° ± 3°C	75	4/			
63° ± 3°C	75	4/			
Dispersion			3.5.4	4.6.2.3	Major
Mann barrel				4.6.2.3.1	
-32° ± 3°C	40	N/A			
21° ± 3°C	40	N/A			
52° ± 3°C	40	N/A			
M242 autogun LR				4.6.2.3.2	
-32° ± 3°C	40	N/A			
21° ± 3°C	40	N/A			
52° ± 3°C	40	N/A			
Trajectory	20	N/A	3.5.5	4.6.2.4	Major
Muzzle velocity 3/			3.5.5.1	4.6.2.4.1	
21° ± 3°C	50	N/A			
Projectile trace (burn time/range)			3.5.7	4.6.2.6.1	Major
-32° ± 3°C	45	0/1			
21° ± 3°C	45	0/1			
52° ± 3°C	45	0/1			

TABLE III. First article inspection (continued)

Examination or Test 1/	Conformance Criteria		Requirement Paragraph	Inspection Method	Classification
	Sample	**Acc/Rej**			
Projectile non-arming			3.5.8	4.6.2.7	Major
-46° ± 3°C	45	0/1			
21° ± 3°C	45	0/1			
63° ± 3°C	45	0/1			
Projectile impact function			3.5.9	4.6.2.7	Major
-46° ± 3°C	45	0/1			
21° ± 3°C	45	0/1			
63° ± 3°C	45	0/1			
Projectile self destruct function			3.5.10	4.6.2.7	Major
-46° ± 3°C	45	0/1			
21° ± 3°C	45	0/1			
63° ± 3°C	45	0/1			
Waterproofness			3.6.1	4.6.3.1	Minor
21° ± 3°C	20	0/1			
Ruggedness 13/			3.6.2	4.6.3.2	Minor
-46° ± 3°C	240	N/A			
63° ± 3°C	240	N/A			
Salt fog	30	4/	3.6.3	4.6.3.3	Minor
Humidity	30	4/	3.6.4	4.6.3.4	Minor

See notes after Table IV.

4.4 Conformance inspection.

4.4.1 Conformance inspection. The sample cartridges shall be subjected to conformance verification in accordance with Table IV.

4.4.2 Conformance rejection. If any sample fails to comply with the conformance inspection requirements, the lot shall be rejected.

TABLE IV. Conformance inspection

Examination or Test 1/	Conformance Criteria		Requirement Paragraph	Inspection Method	Classification
	Sample	Acc/Rej			
Examination for defects	Table V	Table V	3.4.1, 3.7.5, 3.7.7, 3.7.8, 3.7.9, 3.7.10	4.6.1.1, 4.6.4.5, 4.6.4.7, 4.6.4.8, 4.6.4.9, 4.6.4.10	Table V
Projectile torque 2/	20	6/	3.4.2	4.6.1.2	Major
Projectile extraction 2/	20	6/, 8/	3.4.3	4.6.1.3	Major
Primer sensitivity 15/	14/	14/	3.4.6	4.6.1.6	Critical/ Major
Chamber pressure 3/			3.5.1	4.6.2.1	Major
-46° ± 3°C	20	11/			
21° ± 3°C	20	11/			
63° ± 3°C	20	11/			
Action time 3/			3.5.2	4.6.2.1	Major
-46° ± 3°C	20	0/1			
21° ± 3°C	20	0/1			
63° ± 3°C	20	0/1			
Function and casualty, metal parts security			3.5.3	4.6.2.2	Table VI
-46° ± 3°C	50	4/			
21° ± 3°C	50	4/			
63° ± 3°C	50	4/			
Dispersion			3.5.4	4.6.2.3	Major
Mann barrel				4.6.2.3.1	
-32° ± 3°C	40	10/			
21° ± 3°C	40	10/			
52° ± 3°C	40	10/			
Trajectory					Major
Muzzle velocity 3/			3.5.5.1	4.6.2.4.1	
21° ± 3°C	20	11/			
Projectile trace (burn time/range) 16/			3.5.7	4.6.2.6.1	Major
-32° ± 3°C	35	5/			
21° ± 3°C	35	5/			
52° ± 3°C	35	5/			
Projectile non-arming			3.5.8	4.6.2.7	Major
-32° ± 3°C	35	0/1			
21° ± 3°C	35	0/1			
52° ± 3°C	35	0/1			
Projectile impact function			3.5.9	4.6.2.7	Major
-32° ± 3°C	35	0/1			
21° ± 3°C	35	0/1			
52° ± 3°C	35	0/1			
Projectile self destruct function 16/			3.5.10	4.6.2.7	Major
-32° ± 3°C	35	0/1			
21° ± 3°C	35	0/1			
52° ± 3°C	35	0/1			
Waterproofness			3.6.1	4.6.3.1	Minor
21° ± 3°C	20	N/A			

Notes:

1/ As applicable, performance and acceptance as required in this specification apply only when tests are conducted in Mann barrels which conform to drawing 12524502 and are equipped with a muzzle brake

that conforms to drawing 12524004 or M242 autogun barrel assemblies that conform to drawings 12524001, 12524507, or 12524520. Testing from a firm fixed mount with a minimum rigidity of 250,000 in-lbs is required unless qualified with reference ammunition. Unless otherwise indicated, tests shall be conducted with samples at $20^{o} \pm 10^{o}$C. The combining of tests is permitted when acquisition of one data set does not interfere with acquisition of another. If a firing defect of Table VI occurs which would prevent the obtaining of reliable result for the characteristic(s) being tested, a replacement shot shall be fired. These firing defects, whether from a Mann barrel or M242 autogun, shall be added to any found during function and casualty, metal parts security testing (see 3.5.3). M242 autogun burst fire testing shall be conducted with linked belts of ammunition that conform to 12013213.

2/ A single sample may be used for the torque and extraction tests provided no movement is experienced in the torque test which shall be performed prior to extraction testing.

3/ Chamber pressure, muzzle velocity, and action time testing shall be performed concurrently.

4/ The cartridge lot shall be rejected if any malfunction or firing casualty of Table VI occurs in number(s) equal to or greater than the applicable “Rej.” number. Except as otherwise provided, if malfunctions or casualties occur in excess of applicable “Acc.” number, but less than the applicable “Rej.” number, a second sample, double in size, shall be selected. The lot shall be rejected if in the combined samples, malfunctions or casualties occur in numbers equal to or greater than the applicable “Rej.” number.

5/ The lot shall be accepted if no failures occur in the first sample. The lot shall be rejected if three or more cartridges in the first sample fail to comply with the minimum requirements. If one or two cartridge(s) of the first sample fails to comply, a second sample of 35 cartridges shall be tested. The lot shall be rejected if three or more cartridges of the combined sample fail to comply with the minimum requirements. These provisions apply to blinds, flickers, tracer fall-outs, or short burn times.

6/ Failure of two or more sample cartridges to comply with the minimum requirements shall be cause for rejection of the lot. If one cartridge of the sample fails to comply with the minimum requirement, a second sample of 20 cartridges shall be tested. The lot shall be rejected if two or more cartridges of the combined sample fail to comply with the minimum requirement.

7/ For SS testing, each round shall be considered a single event. For LR testing, each five round burst shall be considered a single event with a minimum of three of the five rounds identified for visibility and duration for the event to be successful.

8/ Failure of four or more sample cartridges to comply with the maximum requirement shall be cause for rejection of the lot. If more than one, but less than four sample cartridges fail to comply with the maximum requirement, a second sample of 20 cartridges shall be tested. The lot shall be rejected if five or more cartridges of the combined sample fail to comply with the maximum requirement.

9/ Special action time test with cartridge handling in accordance with AS12013566.

10/ If the sample fails to comply with the requirement, a second sample, of 40 cartridges, shall be tested. The lot shall be rejected if the second sample fails to comply with the requirement.

11/ If the sample fails to comply with the requirement, a second sample, double in size, shall be tested. The lot shall be rejected if the second sample fails to comply with the requirement.

12/ 540 M793 or inert projectile M792 cartridges shall be used to warm the barrel and 3 M792 cartridges shall be used for cook off.

13/ Sample size identification for PA125 ammunition container packout. If the packaging provisions of the contract (see 5.1) specify a different packout, these quantities shall no longer be applicable (see 6.11).

14/ Total sample size shall be as required with an individual sample of 50 per height until All function height and No function height are established. Failure of No function height shall be considered a critical and no second sample shall be tested. If the All function height sample fails to comply with the requirement, a second sample, double in size, shall be tested. The lot shall be rejected if the second sample fails to comply with the requirement. Failure of All function height shall be considered a major.

15/ Testing may be performed at the primed case level.

16/ A single sample may be used for the projectile trace and self destruct function tests when trace burn time is being recorded.

17/ 897 M793 or inert projectile M792 cartridges shall be used to warm the barrel and 3 M792 cartridges shall be used for HEI charge cook off.

18/ Three sets of tests shall be conducted where each set consists of a 3 round burst.

TABLE V. Examination for defects by classification of characteristics

Examination or Test	Conformance Criteria 1/	Requirement Paragraph	Inspection Method 2/
Critical:			
1. Split or perforated case 8/	100%	3.7.9, 3.7.10	AAIE
2. Propellant weight 3/	100%	3.7.9	AAIE
3. Primer above flush	100%	3.4.1	AAIE
4. Propellant type	100%	3.7.9	Visual
5. HEI charge depth 11/	100%	3.7.9	AAIE
6. Crack or split in projectile	100%	3.7.9, 3.7.10	AAIE
7. Fuze not in fully safe configuration 12/	100%	3.5.17	AAIE
Major:			
101. Overall length, maximum	Level IV	3.4.1	AIE
102. Improper depth of primer seating 6/	Level IV	3.4.1	AIE
103. Cocked, loose or inverted primer 6/	Level IV	3.7.10	Visual
104. Sealant missing around primer 6/	Level IV	3.7.10	Visual
105. Profile and alignment 4/, 5/	100%	3.4.1	AIE
106. Ignition component missing or damaged 6/, 7/	Level IV	3.7.9, 3.7.10	Visual
107. Crimp missing, improper, incomplete (case/projectile)	100%	3.4.1, 3.7.10	AIE
108. Split or perforated case 9/	100%	3.7.10	AIE/Visual
109. Missing, cracked, split or dented fuze nose cap	Level IV	3.7.10	Visual
110. Loose fuze 10/	Level IV	3.7.10	Visual
Minor:			
201. Evidence of corrosion	Level II	3.7.10	Visual
202. Marking incorrect, incomplete, illegible or missing	Level II	3.7.5, 3.7.10	Visual
203. Cartridge case defect (i.e. case draw, case dent, fold, bulge, wrinkle, or buckle)	Level II	3.7.10	Visual
204. Presence of foreign matter	Level II	3.7.10	Visual
205. Color improper	Level II	3.7.7	Visual
206. Rotating band damage	Level II	3.4.1, 3.7.10	Visual
207. Gap between fuze and projectile body	Level II	3.7.10	Visual

Notes:

1/ The use of the term “100%” requires that the applicable inspection or non destructive test be accomplished on the entire lot population. Sampling plans for major and minor characteristics shall be in accordance with MIL-STD-1916, with the exception of “profile and alignment”, “crimp missing, improper, incomplete”, and “split or perforated case” which is 100% inspection (see note 5 below).

2/ MIL-STD-651 shall apply in defining and evaluating visual defects, as applicable. AAIE is automatic acceptance inspection equipment. AIE is acceptance inspection equipment.

3/ Charge weight established to meet muzzle velocity required for trajectory conformance while not exceeding the chamber pressure requirement.

4/ A dead weight load of 60 pounds may be used to insert the cartridge into the gage.

5/ Discrepant cartridges shall be removed from the lot.

6/ Inspection may be performed at the primed case level.

7/ As applicable per the technical data package of the qualified design.

8/ Any split or perforations in K, L, M zones of Figure 1 shall be considered a Critical defect. Any split or perforations in any zone of Figure 1 that allows propellant to leak shall be considered a Critical defect.

9/ Any split or perforations not covered by Critical 1 shall be considered a Major defect.

10/ When the fuze turns with respect to the projectile body upon application of the required torque in a counterclockwise direction, the cartridge shall be classed defective.

11/ Inspection may be performed at the projectile assembly level.

12/ Inspection may be performed on the fuze before assembly to the projectile.

TABLE VI. Firing defects 5/

Defect Description 1/	Acc	Rej	Classification
Cartridge:			
Misfire	0	1	Major
Failure to chamber	0	1	Major
Failure to extract	0	1	Major
Projectile remaining in bore	0	1	Critical
Premature projectile function 6/	0	1	Critical
Primer:			
Primer leak	4	9	Minor
Primer perforation	1	6	Major
Loose primer	0	1	Major
Blown primer	0	1	Major
Case:			
Longitudinal split 2/			
H or S	4	11	Minor
G or J	2	4	Minor
K, L, or M	0	1	Critical
Circumferential rupture (partial) 2/			
S, J, or K	2	4	Minor
G or L	1	3	Major
Circumferential rupture (complete) 2/	0	1	Critical
Detached metal 3/	0	1	Critical
Projectile:			
Metal parts separation 4/	0	1	Major
Yaw in excess of 5^{o}	5	15	Minor

Notes:
1/ Defect definitions are contained in AS12013566.

2/ See Figure 1 for classifying splits and ruptures in fired cartridge cases. If a longitudinal split or circumferential rupture (partial) extends into two or more defined areas, only the most severe defect criterion of Table VI for the areas involved shall apply. If a rupture results in separation of the cartridge case into two or more portions, the defect shall be classified as a complete circumferential rupture.

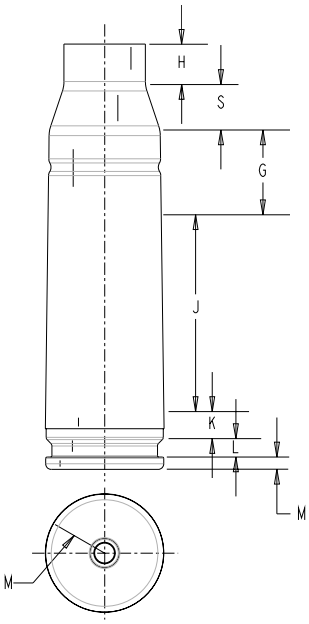
3/ Metal sheared or missing from the fired cartridge case exterior, such as rim or neck shears, shall be classed as a defect. The lot shall not be penalized from shavings of metal from the interior wall of the neck in the crimped area.

4/ Breakup of metal parts, as evidenced by evaluation of hole(s) in the witness panel(s) or by recovery of part(s), shall be classified as a defect. The lot shall not be penalized for normal band fringing.

5/ The lot shall be suspended and referred for disposition if a malfunction or casualty not covered by this specification occurs in any testing.

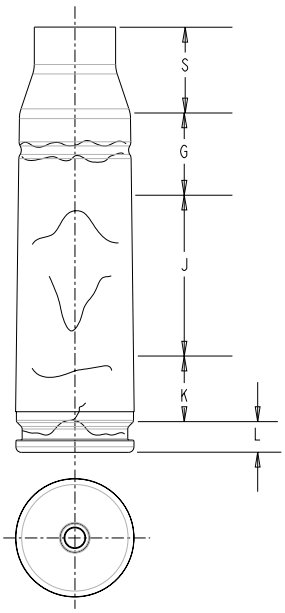
6/ Any fuze function from in bore to safe separation distance from muzzle.

Splits



G - In link groove section
H - In mouth or neck
J - In main body section, no closer than 0.25 inch to extractor groove
K - In lower body section from forward edge of extractor groove
L - In extractor groove
M - In case head
S - In shoulder section

Ruptures/Perforations



G - In link groove section
S - In neck and shoulder
J - In upper 0.75 body section
K - In lower 0.25 body section above extractor groove
L - In head and extractor groove

FIGURE 1. Identification of defects for case, cartridge, 25mm.

4.5 Examinations and tests. Reference shall be made to MIL-STD-1916 for the definition of critical, major, and minor defects. The attribute sampling plan required for the examination for defects in Table V shall be in accordance with MIL-STD-1916, using Verification Level IV for major characteristics and Level II for minor characteristics unless otherwise noted. One hundred percent inspection shall be used on all critical characteristics.

4.6 Methods of inspection.

4.6.1 Interface and interoperability.

4.6.1.1 Weapon interface. Each cartridge shall be inserted into a chamber gage that conforms to drawing 9391400 to check for profile and alignment. The maximum force to insert the cartridge into the gage shall be 60 pounds.

4.6.1.2 Projectile torque. Each cartridge of the test sample shall be visibly marked. The mark shall extend axially along the projectile assembly to the case. The torque specified shall be applied gradually. Movement of the projectile assembly with respect to the cartridge case as evidenced by the misalignment of the mark shall be classified as a defect.

4.6.1.3 Projectile extraction. The method of test shall be as specified in AS12013566.

4.6.1.4 Noise. Testing for noise output shall be conducted in accordance with the procedures in TOP 1-2-608. The sample cartridge shall be conditioned for a minimum of four hours at the applicable temperature and fired from the M242 autogun in the single shot mode.

4.6.1.5 Toxic fumes. Testing for toxic fumes shall be conducted in accordance with TOP 2-2-614. The control and sample cartridges shall be conditioned for a minimum of four hours at the applicable temperature and fired from the M242 autogun in the single shot mode.

4.6.1.6 Primer sensitivity. The method of test shall be as specified in AMCR 715-505 Volume 8 except that 25x137mm steel cartridge cases shall be allowed as applicable. The complete rundown test shall be used. Testing conducted at primer component level shall be accepted.

4.6.2 Operating.

4.6.2.1 Chamber pressure and action time. The cartridges shall be tested in accordance with AS12013566, excluding alternate method for obtaining chamber pressure by measuring case mouth pressure. Chamber pressure shall be measured with a piezoelectric transducer that conforms to drawing 12910127. The cartridges shall be conditioned for a minimum of four hours at the applicable temperature and fired from a Mann barrel.

4.6.2.2 Function and casualty, metal parts security. The cartridges shall be tested in accordance with AS12013566. The M242 autogun barrel used shall have a minimum of 2000 rounds previously fired through it. The cartridges shall be conditioned for a minimum of four hours at the applicable temperature. All firings shall be at 200 $\pm$ 25 spm in bursts of 25 $\pm$ 3 rounds with a short pause between bursts. The weapon shall be cooled to ambient temperature after each temperature test is completed. The witness screens shall be examined for fragment imprints that are indication of metal parts security failures. Evidence of yaw, erratic flight characteristics, firing defects in accordance with Table VI, or unintended weapon stoppages shall be recorded. Witness screen replacement shall be provided as needed.

4.6.2.3 Dispersion. The cartridges shall be tested in accordance with AS12013566. The cartridges shall be conditioned for a minimum of four hours at the applicable temperature. Cloth or paper targets, when used, shall be taut; without sagging or wrinkles. The standard deviation of each cartridge group shall be calculated in both the horizontal and vertical directions. The computation shall be in accordance with AS12013566.

4.6.2.3.1 Mann barrel test.

4.6.2.3.1.1 Design verification and first article inspection. The sample cartridges shall be tested at 1500 meters.

4.6.2.3.1.2 Conformance inspection. Testing of conformance inspection samples shall be at a range between 100 and 300 meters.

4.6.2.3.2 M242 burst fire test. The sample cartridges shall be tested at 1500 meters. The cartridges shall be fired at a rate of 100 ± 25 spm in 5 round bursts.

4.6.2.4 Trajectory. The sample cartridges shall be conditioned for a minimum of four hours at the applicable temperature and fired from the M242 autogun on the single shot mode or Mann barrel, whichever is preferred. Projectile velocity verses time data shall be measured with radar. Twenty M792 rounds shall be fired. Computerized simulation using PRODAS or similar ballistic analysis code with the standard atmospheric model and the average reduced data from the radar track shall be used to compute the trajectory. The difference in position of the computed trajectory with that of FT 25-A-2 out to 3000 meters shall be made (see 6.13).

4.6.2.4.1 Muzzle velocity. The muzzle velocity required to achieve the trajectory requirement shall be determined during design verification and indicated on the top drawing. Muzzle velocity shall be measured in accordance with AS12013566. The sample cartridges shall be conditioned for a minimum of four hours at the applicable temperature and fired from a Mann barrel (see 6.13).

4.6.2.4.2 Time of flight. The cartridges shall be tested in accordance with ITOP 4-2-805 and TOP 4-2-827 or a method with an equivalent accuracy. The average time of flight for the M792 group to 500, 1000, 1500, 2000, 2500, and 3000 meters shall be calculated. The differences in the average time of flight between the M792 groups with that FT 25-A-2 shall be calculated.

4.6.2.5 Surface danger zone. The sample cartridges shall consist of inert projectiles of the same weight, shape and mass properties as the M792 projectile, to the maximum extent possible shall consist of the same materials as the M792 with an inert fill representing the high explosive charge in the warhead, shall be loaded with the same propellant charge as the M792 and be conditioned for a minimum of four hours at the applicable temperature and fired from the M242 autogun in the single shot mode.

4.6.2.5.1 Maximum range. Prior to firing, a determination shall be made by computer modeling or other method of the weapon elevation angle that shall produce the maximum range. The sample cartridges shall be fired at this angle for maximum range confirmation. Projectile velocity verses time data shall be measured with radar or other suitable means. Twenty M792 rounds shall be fired. Computer simulation using PRODAS or similar ballistics analysis code with the standard atmospheric model and the average reduced data from the radar track shall be used to compute maximum range.

4.6.2.5.2 Ricochet. Testing shall require the collection of ricochet data for direct-fire projectiles that are produced after striking earth for up to three impact angles and up to two impact distances. For each impact condition a minimum of 25 data points are required for statistical analysis. Selection of impact angles and distances are established through ballistic modeling and engagement requirements. The collected and processed tracking radar data (impact angle and velocity, ricochet elevation, azimuth and velocity, and post ricochet drag) are used with ballistic models and safety factors to establish surface danger areas. If found necessary, ricochet tests may require data collection for additional impact surface such as water and/or armor plate.

4.6.2.6 Projectile trace.

4.6.2.6.1 Burn range/time. The cartridges shall be tested in accordance with AS12013566. The sample cartridges shall be conditioned for a minimum of four hours at the applicable temperature and fired from the M242 autogun in the single shot mode or Mann barrel, whichever is preferred. Time or range of trace functioning shall be determined as measured from the muzzle of the weapon (see 6.13). If

measuring burn time, weapon elevation shall ensure a minimum of a 4000 meter projectile free flight (or until self destruct) before ground impact. Burn time testing requires time of flight testing data (see 4.6.2.4.2).

4.6.2.6.2 BFVS visibility. The sample cartridges shall be conditioned as necessary and fired from the M242 autogun in an A2ODS (Operation Desert Storm) BFVS with an ISU in accordance with MIS36602 and A3 BFVS with IBAS in accordance with MIS-PRF-52925. The test shall be conducted during daylight hours, preferably mid-morning to early afternoon, so as to avoid excessive sun glare. Tracer evaluations shall be made against a dark background target at a distance of 2000 meters. Cartridges are to be fired both in the single shot and 100 spm modes. An operational scoring methodology (see 6.12.2) based on the commentary from two BFVS observers as to trace performance to the 2000 meter target shall be used. Trace performance shall be judged on burn consistency, color, and intensity to 2000 meters.

4.6.2.7 Projectile function. The cartridges shall be tested in accordance with AS12013566. The sample cartridges shall be conditioned for a minimum of four hours at the applicable temperature and fired from the M242 autogun in the single shot mode or Mann barrel, whichever is preferred. For projectile non-arming and projectile impact function, the aluminum target shall be located as required from the gun muzzle normal to the line of fire. For projectile non-arming (see 6.13), fragmentation testing is required (see 4.6.2.12) to determine the safe separation distance which shall be the distance the aluminum target is located from the weapon muzzle. For projectile self-destruct (see 6.13), time to self-destruct requires time of flight testing (see 4.6.2.4.2). Weapon elevation shall ensure a minimum of a 4000 meter projectile free flight (or until self destruct) before ground impact.

4.6.2.8 Smoke. The cartridges shall be tested in accordance with TOP 3-2-045. The sample cartridges shall be conditioned for a minimum of four hours at the applicable temperature and fired from the M242 autogun at 200 ± 25 spm. A 2.44 meter square target with alternating 0.61 meter black and white squares shall be placed 100 meters forward of and in the line of fire of the M242 autogun. Fire one ten-round burst. Immediately after completion of the burst, the checkerboard target shall be photographed. The camera shall be placed directly behind and no higher than 1 meter above the weapon. The ability to identify the checkerboard pattern, as evidenced by the photograph, shall be used as the means for evaluating target visibility through the smoke cloud.

4.6.2.9 Flash. The cartridges shall be tested in accordance with AS12013566. The sample cartridges shall be conditioned for a minimum of four hours at the applicable temperature and fired from the M242 autogun at a rate of 200 ± 25 spm in ten-round bursts. The cumulative flash from the burst shall be photographed; both at the breech and muzzle. The photo shall determine the occurrence of breech flash.

4.6.2.10 Cook off. A sample of M793 (or inert projectile M792) cartridges using the same propellant charge as the M792 test specimen shall be fired from the M242 autogun at 200 ± 25 spm. 180 cartridges shall be fired in ten-round bursts, one burst every 5 seconds. Immediately after completion of firing 180 rounds, an M792 test cartridge shall be chambered (modification to the primer is acceptable to insure the chambered round does not function if struck by the firing pin). The test cartridge shall remain chambered for 30 minutes or until cook off, whichever occurs first. Functioning during the 30 minutes shall be cause for rejection. The test shall be repeated twice more beginning with a range ambient gun barrel.

4.6.2.11 HEI charge cook off. A sample of M793 (or inert projectile M792) cartridges using the same propellant charge as the M792 test specimen shall be fired from the M242 autogun at 200 ± 25 spm. 299 cartridges shall be fired in ten-round bursts, one burst every 5 seconds (with the last burst being 9

rounds). Immediately after completion of firing 299 rounds, an M792 test cartridge shall be chambered (modification to the primer is acceptable to insure the chambered round does not function if struck by the firing pin). The test cartridge shall remain chambered for 30 minutes or until cook off, whichever occurs first. If the high explosive charge functions before the propellant during the 30 minutes it shall be cause for a rejection. The test shall be repeated twice more beginning with a range ambient gun barrel. In lieu of heating the barrel with the firing of live ammunition, an alternate heat block inspection method is permissible (see 6.15).

4.6.2.12 Fragmentation. The test sample shall consist of nine fuzeless but loaded projectiles, without primed cartridge case and propellant. The projectile shall be capped to replicate the containment offered by the fuze. Three projectiles each shall be statically detonated using saw-dust fragment recovery (see 4.6.2.12.1), flash x-ray (see 4.6.2.12.2), and framing camera (see 4.6.2.12.3) respectively. Static detonation for each test may be accomplished with the use of an exploding bridgewire or equivalent method. The mass of the projectile metal parts (projectile sans explosives) shall be known prior to testing.

4.6.2.12.1 Saw-dust fragment recovery. The sample projectile shall be suspended inside an ordinary air filled balloon which is subsequently placed in the center of a suitable container completely surrounded with loose pack saw-dust. Kiln dried and screened grade 4/5 hardwood or equivalent is suitable saw-dust for this test. The balloon shall provide a minimum of 5 calibers of free space completely surrounding the projectile to allow initial unimpeded fragmentation of the warhead. The volume and density of the saw-dust shall be sufficient to contain all projectile fragments without causing discernible damage to the fragments. Fragment recovery from the saw-dust after the test shall be accomplished by magnetic or density filtration or other suitable methods. 98% by mass fragment recovery is required for a valid test. Fragments shall be counted and weighed and the results presented in spreadsheet format for subsequent lethality modeling (see 4.6.2.12.4).

4.6.2.12.2 Flash x-ray. The sample projectile shall be detonated to allow two images of the expanding projectile body to be captured on x-ray film. The two images should give a 360 degree view of the side profile of the projectile. The two images shall be at two different times and allow sufficient distance between the fragment fronts so that a velocity may be calculated from the known x-ray flash times and the distance traveled by the fragments. Velocity analysis shall take into account the x-ray head offset, the magnification factor, and fragment path angle. Velocity analysis distances shall be obtained through the use of Photoshop or other digital imaging software. The velocity analysis results shall be presented in spreadsheet format for subsequent lethality modeling (see 4.6.2.12.4).

4.6.2.12.3 Framing Camera. The sample projectile shall be detonated to allow sequential images to be captured by the camera early in the fragmentation breakup of the projectile. The camera shall be capable of at least 1 million frames per second with frame duration of 0.25 microseconds and a total duration of at least 25 microseconds. The camera should have sufficient resolution to obtain images that shall start with the projectile and then progress as the projectile detonates until the images are obscured by the products of detonation, usually in the 10 to 15 microsecond range. Results shall be digitized and a movie produced from the images.

4.6.2.12.4 Lethality modeling. The data from the saw dust fragment recovery and flash x-ray tests shall be used to generate the Joint Munitions Effectiveness Manual (JMEM) files that are necessary for Casualty Reduction Modeling (CASRED) / lethality modeling. JMEM file generation details need to be considered. Fragment distribution for natural fragmentation of steel shall be considered uniform. The shape factor for natural fragmentation of steel shall be obtained from measured fragments from an existing test database (see 6.16).

4.6.2.13 Incendiary. The sample cartridges shall be conditioned for a minimum of four hours at the applicable temperature and fire a 3-round burst from the M242 autogun at the high rate mode of 200

spm. The fired projectiles shall impact a 0.063 inch nominal thickness 2024-T3 aluminum plate at 0°C ±10°C obliquity, at a distance of 100 meters from the muzzle. One meter behind and in the line of the fire of the target plate shall be a steel commercial 5 gallon jerrican 70% full of conventional No. 2 diesel fuel. A second 0.063 inch nominal thickness 2024-T3 aluminum plate, or equivalent, at 0°C ±10°C obliquity shall be placed at a distance of 2.5 meters behind the jerrican and in the line of fire of the target plate. Sustained ignition of the container of diesel fuel constitutes a successful event.

4.6.2.14 Fuze system. Verification by examination of objective evidence that the fuzing system is qualified by the Army Fuze Safety Review Board (see 6.14).

4.6.3 Environmental.

4.6.3.1 Waterproofness. The cartridges shall be tested in accordance with AS12013566, excluding alternate method for obtaining chamber pressure by measuring case mouth pressure.

4.6.3.1.1 Design verification and first article inspection. The cartridges shall be disassembled and the projectiles, propellant, and cartridge cases shall be examined under ultraviolet light for evidence of leakage. Leakage paths and other effects of water entry shall be noted. Photographs shall be taken, as required. Evidence of water entry into the cartridge case, projectile body or fuze shall be cause for rejection of the lot.

4.6.3.1.2 Conformance inspection. After submersion in the water bath (use of sodium fluoresceinate is not required), the cartridges shall be conditioned for a minimum of four hours at the applicable temperature and fired from a Mann barrel. The cartridges shall be tested in accordance with AS12013566, using drilled cases (excluding alternate method for obtaining chamber pressure by measuring case mouth pressure). Chamber pressure shall be measured with a piezoelectric transducer that conforms to drawing 12910127. Compare the average muzzle velocity of the waterproofness tested "wet" cartridges with the average muzzle velocity obtained for the "dry" cartridges tested under section 4.6.2.4.1. The average "wet" velocity of projectiles of the sample cartridges shall not vary from the average "dry" velocity by more than 30.5 meters per second. The action time of the "wet" cartridges shall not exceed 6.0 milliseconds. The average chamber pressure of the "wet" cartridges plus 3.0 standard deviations shall not exceed 496 MPa, with no individual value exceeding 496 MPa.

4.6.3.2 Ruggedness. A sequential ruggedness test shall be performed in accordance with the outline of Table VII (see 6.9) and shall consist of the following phases in order of occurrence: secured cargo vibration, 2.1 meter packaged drop, loose cargo, and 1.5 meter unpackaged drop. A sample of cartridges shall be withdrawn after each test phase for test firing from a Mann barrel or an M242 autogun at 200 ± 25 spm as described below.

4.6.3.2.1 Secured cargo vibration phase. This test shall be conducted in accordance with ITOP 1-2-601 (see Figure 2). Before the test, each cartridge and link shall be visually inspected for damage from previous transportation and handling, as well as any obvious irregularities in packaging. The sample cartridges shall be packaged in accordance with the packaging provisions of the contract (see 5.1) and conditioned at the applicable temperature for a minimum of 12 hours prior to being subjected to this test (see Table VII, Part A). At the conclusion of this test, all cartridges, links and packing materials shall be visually inspected for evidence of deformation, damage or defects other than light scuffmarks and scratches as defined in MIL-STD-651. Such damage shall be cause for rejection of the lot. Three containers (ninety cartridges) from each temperature group shall then be randomly selected and those cartridges fired per the requirements of Table VIII.

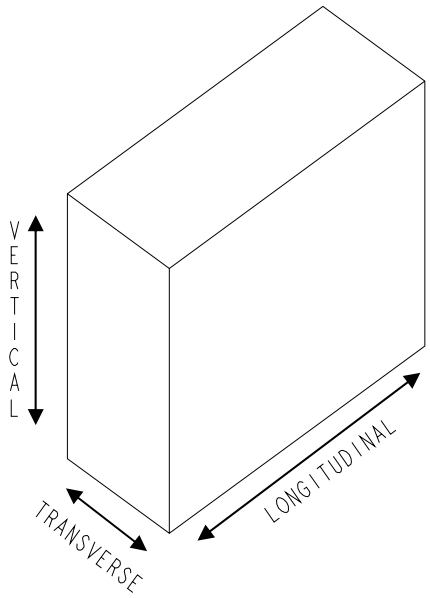


FIGURE 2. Container vibration axes definition

4.6.3.2.2 2.1 Meter packaged drop phase. After completion of the secured cargo transportation vibration phase and removal of the sample for firing, the remaining cartridges shall be inspected, repackaged (new containers are permitted), and then subjected to the 2.1 meter packaged drop phase. This phase shall be conducted in accordance with ITOP 4-2-602 and follows the secured cargo vibration phase. The sample cartridges shall be packaged in accordance with the packaging provisions of the contract (see 5.1) and conditioned at the applicable temperature for a minimum of 12 hours prior to being subjected to this test (see Table VII, Part B). The packaged cartridges shall be dropped on all three axes defined in Figure 2. At the conclusion of this test, all cartridges, links and packing materials shall be visually inspected for evidence of deformation, damage or defects that would render them unsafe to handle, transport, or fire as defined in MIL-STD-651. Damage to the extent that the rounds can not be safely handled or transported shall be cause for rejection of the lot. If judged to be safe to handle, transport and fire, one container and one 15-round belt (45 cartridges) from each temperature group shall then be selected and fired per the requirements of Table VIII.

4.6.3.2.3 Loose cargo phase. After completion of the 2.1 meter packaged drop phase and removal of the sample for firing or assessed to be unsafe to handle, transport or fire, the remaining cartridges shall be inspected, repackaged (new containers, dunnage or M919 cartridges shall be substituted as needed and annotated as such) and then subjected to the loose cargo phase. This phase shall be conducted in accordance with ITOP 4-2-602. The sample cartridges, with the exception of the 15 round link belt, shall be packaged in accordance with the packaging provisions of the contract (see 5.1) and conditioned at the applicable temperature for a minimum of 12 hours prior to being subjected to this test (see Table VII, Part C). At the conclusion of this test, all cartridges, links and their packing materials shall be visually inspected for evidence of deformation, damage or unusual defects that would render them unsafe to handle, transport, or fire as defined in MIL-STD-651. Damage to the extent that the rounds can not be safely handled or transported shall be cause for rejection of the lot. If judged to be safe to handle, transport and fire, one container and one 15 round link belt (45 cartridges) from each temperature group shall then be selected and fired per the requirements of Table VIII.

4.6.3.2.4 1.5 Meter unpackaged drop phase. After completion of the loose cargo phase and removal of the sample for firing or assessed to be unsafe to handle, transport or fire, the remaining

cartridges shall be inspected, delinked, and then subjected to the 1.5 meter unpackaged drop phase. This phase shall be conducted in accordance with ITOP 4-2-602. The sample cartridges shall be conditioned at the applicable temperature for a minimum of four hours prior to being subjected to this test (see Table VII, Part D). At the conclusion of this test, all cartridges shall be inspected for evidence of deformation, damage, or unusual defects that would render them unsafe to handle, transport, or fire as defined in MIL-STD-651. Damage to the extent that the rounds can not be safely handled or transported shall be cause for rejection of the lot. If judged to be safe to handle, transport and fire, the cartridges shall be relinked and fired per the requirements of Table VIII.

TABLE VII. Ruggedness (rough handling) test outline

Part A: Secured Cargo Vibration Phase (4.6.3.2.1)	
8 Containers (240 Cartridges) –46°C • Visual inspection for damage • Secured cargo vibration • Photos and visual inspection • Remove 3 containers, mark each with A1, and fire per Table VIII	8 Containers (240 Cartridges) 63°C • Visual inspection for damage • Secured cargo vibration • Photos and visual inspection • Remove 3 containers, mark each with A2, and fire per Table VIII
Part B: 2.1 Meter Packaged Drop Phase (4.6.3.2.2)	
5 Containers (150 Cartridges) –46°C • Visual inspection for damage • Packaged rounds dropped once in each of 3 orientations (see Figure 2) • Photos and visual inspection • Remove (1) container and 1-15 round link belt, mark each with B1, and fire per Table VIII	5 Containers (150 Cartridges) 63°C • Visual inspection for damage • Packaged rounds dropped once in each of 3 orientations (see Figure 2) • Photos and visual inspection • Remove (1) container and 1-15 round belt, mark each with B2, and fire per Table VIII
Part C: Loose Cargo Phase (4.6.3.2.3)	
3 Containers and 1-15 Round Link Belt (105 Cartridges) –46°C • Visual inspection for damage • Vertical and horizontal vibration • Photos and visual inspection • Remove 1 container, mark with C1, remove the 15 round belt, mark with C2; fire per Table VIII	3 Containers and 1-15 Round Link Belt (105 Cartridges) 63°C • Visual inspection for damage • Vertical and horizontal vibration • Photos and visual inspection • Remove 1 container, mark with C3, remove the 15 round belt, mark with C4; fire per Table VIII
Part D: 1.5 Meter Unpackaged Drop Test Phase (4.6.3.2.4)	
60 Cartridges –46°C • Visual inspection for damage • Drop 10 rounds nose down and mark D1 • Drop 10 rounds base down and mark D2 • Drop 10 round horizontal and mark D3 • Drop 10 rounds 45° base down and mark D4 • Drop 10 rounds 45° nose down and mark D5 • Drop 10 rounds in each of the 5 orientations and mark D6 • Photos and visual inspections • Fire per Table VIII	60 Cartridges 63°C • Visual inspection for damage • Drop 10 rounds nose down and mark D7 • Drop 10 rounds base down and mark D8 • Drop 10 round horizontal and mark D9 • Drop 10 rounds 45° base down and mark D10 • Drop 10 rounds 45° nose down and mark D11 • Drop 10 rounds in each of the 5 orientations and mark D12 • Photos and visual inspections • Fire per Table VIII

TABLE VIII. Ruggedness firing schedule

Marking ID	Sample Qty	Requirement Paragraph	Inspection Method	Applicable Notes
A1	40	3.5.1, 3.5.2, 3.5.4, 3.5.5.1, 3.5.7	4.6.2.1, 4.6.2.3.1.1, 4.6.2.4.1, 4.6.2.6	1/, 2/
A2	40	3.5.1, 3.5.2, 3.5.4, 3.5.5.1, 3.5.7	4.6.2.1, 4.6.2.3.1.1, 4.6.2.4.1, 4.6.2.6	1/, 2/
A1	50	3.5.3	4.6.2.2	1/, 2/
A2	50	3.5.3	4.6.2.2	1/, 2/
B1	45	3.5.3	4.6.2.2	1/, 3/
B2	45	3.5.3	4.6.2.2	1/, 3/
C1	30	3.5.3	4.6.2.2	1/, 3/
C2	15	3.5.3	4.6.2.2	1/, 3/
C3	30	3.5.3	4.6.2.2	1/, 3/
C4	15	3.5.3	4.6.2.2	1/, 3/
D1	10	3.5.3	4.6.2.2	1/, 4/
D2	10	3.5.3	4.6.2.2	1/, 4/
D3	10	3.5.3	4.6.2.2	1/, 4/
D4	10	3.5.3	4.6.2.2	1/, 4/
D5	10	3.5.3	4.6.2.2	1/, 4/
D6	10	3.5.3	4.6.2.2	1/, 4/
D7	10	3.5.3	4.6.2.2	1/, 4/
D8	10	3.5.3	4.6.2.2	1/, 4/
D9	10	3.5.3	4.6.2.2	1/, 4/
D10	10	3.5.3	4.6.2.2	1/, 4/
D11	10	3.5.3	4.6.2.2	1/, 4/
D12	10	3.5.3	4.6.2.2	1/, 4/

Notes:

1/ All rounds shall be conditioned for a minimum of four hours at $21^{o} \pm 3^{o}$C prior to firing.

2/ As applicable, Mann barrel firings shall be in 20-round groups at 1500 meters and M242 autogun firings shall be in 25-round bursts. Pressure, velocity, action time, dispersion, and trace Mann barrel testing shall be done concurrently. Visible confirmation of the continuous trace to target shall verify trace performance.

3/ M242 autogun firings shall be in 15-round bursts.

4/ M242 autogun firings shall be in 10-round bursts.

4.6.3.3 Salt fog. The unpackaged cartridges in the M28 link belt (drawing 12013213) shall be tested in accordance with test method 509.4 of MIL-STD-810 utilizing the straight 48-hour salt fog exposure. After exposure to the salt fog environment, the cartridges shall be examined for evidence of contamination, damage, corrosion, and salt infiltration. The cartridges shall then be fired from the M242 autogun at 200 ± 25 spm to determine whether the cartridge feeds and functions safely after exposure to the salt fog environment. The cartridge shall satisfy function and casualty and metal parts security requirements (see 3.5.3)

4.6.3.4 Humidity. The unpackaged cartridges in the M28 link belt (drawing 1203213) shall be tested in accordance with test method 507.4 of MIL-STD-810. The test duration shall satisfy the minimum of five 48-hour testing cycles. After exposure to the humidity environment, the cartridges shall

be examined for evidence of resulting contamination, damage, and corrosion. The cartridges shall then be fired from the M242 autogun at 200 ± 25 spm to determine whether the cartridge feeds and functions safely after exposure to the temperature and humidity environment. The cartridge shall satisfy function and casualty and metal parts security requirements (see 3.5.3).

4.6.3.5 Extreme temperature/long term storage. Extreme temperature/long term storage testing shall be in accordance with Procedure I of test method 501.4 of MIL-STD-810 at a constant temperature of 63° ± 3°C for the hot environment and Procedure I of test method 502.4 of MIL-STD-810 at a constant temperature of -46° ± 3°C for the cold environment. The cartridges shall be tested as packaged in accordance with the packaging provisions of the contract (see 5.1) and conditioned at the respective temperature for a duration of 28 days. After exposure to the long term storage environment, the cartridges shall be examined for evidence of resulting defects, if any. The cartridges shall then be conditioned to 21° ± 3°C for a minimum of four hours and fired to verify the requirements of 3.5.1 (average plus 2.0 standard deviations $\leq$ 496 MPa), 3.5.2 and 3.5.5.1.

4.6.3.6 Temperature shock. Temperature shock testing shall be in accordance with Procedure II of test method 503.4 of MIL-STD-810 cycling between temperatures of 63° $\pm$ 3°C and -46° $\pm$ 3°C. The cartridges shall be tested as packaged in accordance with the packaging provisions of the contract (see 5.1). After exposure to the temperature shock environment, the cartridges shall be examined and photographed for evidence of resulting defects, if any. The cartridges shall then be conditioned to 21° $\pm$ 3°C for a minimum of four hours and fired per the requirements of 3.5.1 (average plus 2.0 standard deviations $\leq$ 496 MPa), 3.5.2 and 3.5.5.1.

4.6.4 Support and ownership.

4.6.4.1 Final hazard classification (FHC). M792 cartridges, packaged in accordance with the packaging provisions of the contract (see 5.1), shall be tested in accordance with TB 700-2. The following test series shall be used: single package test, stack test, external fire test, thermal stability and 12 meter drop test.

4.6.4.2 Energetic material qualification. Verification by examination of objective evidence that all energetic materials are qualified by the Army Qualification Authority (see 6.8).

4.6.4.3 Energetic material compatibility. Compatibility tests shall be conducted in accordance with AOP-7. Compatibility is demonstrated when results reflect negligible reactivity.

4.6.4.4 Propellant flame temperature. The isochoric flame temperature of the propellant shall be calculated by the Hirshfelder-Sherman technique or comparable free energy program.

4.6.4.5 Ammunition lot numbering. All cartridges shall be visually inspected for correct and identifiable marking. The criteria for grading defects shall be in accordance with MIL-STD-651 and MIL-STD-1168.

4.6.4.6 Insensitive munitions. Insensitive munitions testing shall be in accordance with MIL-STD-2105 excluding spall impact test and STANAG 4382. Upon successful completion, certification shall be obtained from the Army Insensitive Munitions Board, Picatinny, NJ 07806-5000.

4.6.4.7 Cartridge color. Cartridges shall be visually inspected for color conformance in accordance with ASTM D1729.

4.6.4.8 Marking. Cartridges shall be visually inspected for marking defects in accordance with MIL-STD-651.

4.6.4.9 Conformance to baseline. Cartridges shall be inspected for defects listed in Table V and either Table II, Table III, or Table IV, as appropriate.

4.6.4.10 Workmanship. Cartridges shall be inspected for the defects listed in Table V. The criteria for grading defects shall be in accordance with MIL-STD-651.

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 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 activities within the Military Service or Defense Agency, or within the military service's system commands. 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 intended for use in the US military M242 autogun. The 25mm cartridges procured to this specification are military unique because:

a. There are no commercial 25mm cartridges.
b. The propellant used in the M792 cartridge must meet the military's propellant stability and shelf life storage requirements of 20 years, which exceeds commercial industries' normal requirements.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number and date of this specification and all reference documentation cited in this specification (see 2.2.1). Note, reference documents will be those current at the time of solicitation or contract.
b. Requirements for submission of design verification sample (if applicable): A design verification sample, either in part or complete (Table II), may be required for the qualification of a new material, vendor, production process, or design configuration as directed by the contracting officer.
c. Requirements for submission of first article sample (if applicable): A first article sample, either in part or complete (Table III), may be required for the commencement of production after the award of a new contract, a change in production venue, production process, or after a production stoppage in excess of 90 days as directed by the contracting officer.
d. Requirement for submission of inspection equipment designs.
e. Applicable national stock number.
f. Packaging requirements. Special packaging requirements apply to this round; see 12929427, Packing and Marking for Container, Ammo PA125 for linked 25mm Ammunition. Contact AMSTD-AAR-AIL-P, US Army ARDEC, Picatinny, NJ 07806-5000.
g. Requirement for certificates of conformance for each lot or shipment of product.
h. Requirement for when an FHC, energetic material qualification, propellant stability, Explosion Ordnance Disposal or pyrotechnic sensitivity test is required.

i. Requirement and provisions for submission of test data as required.

j. Ammunition belts will be linked in accordance with 12013213, Link Assembly, 25mm, M28.

k. Requirement for submission of detail test plan: a detail test plan is required for design verification tests. The detail test plan must contain test and inspection procedures, gage designs details, test equipment details and test setup details. The contract must specify the level of detail required for the detailed test plan submission. Approval of the test plan by the PCO is required prior to any test.

l. The following is provided as reference information: Drawing 11820609, Fuze, Point Detonating, Self-Destruct, 25mm, M758. The M758 fuze is the only fuze currently approved by the Army Fuze Safety Review Board for use with the M792 cartridge.

6.3 Automatic acceptance inspection equipment (AAIE). Provision concerning the AAIE used to verify the requirements of this specification should be specified in the contract.

6.4 Submission of inspection equipment designs for approval. Submit copies of designs as required to: Commander, US Army ARDEC, AMSRD-AAR-QEM-F, Picatinny, NJ 07806-5000. This address will be specified on the Contract Data Requirements List, DD Form 1423 in the contract.

6.5 Ammunition lot numbers. Ammunition lots require ammunition data cards in accordance with MIL-STD-1168.

6.6 Verification rejection action. Failure of an assembly, component or test specimen to comply with any of the requirements may result in a termination of inspection. In the event of a rejection, a request may be made to take corrective action and submit a new inspection sample quantity.

6.7 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 US Army ARDEC, AMSRD-AAR-QES-C, Picatinny, NJ, 07806-5000.

6.8 Energetic material qualification information. Qualification of energetic materials by the Army Service Qualification Authority requires a demonstration that the energetic material meets the requirements. This task is addressed in the statement of work in the contract. Points of contact for the Army Service Qualification Authority can be obtained from US Army ARDEC, AMSRD-AAR-QES-C, Picatinny, NJ, 07806-5000.

6.9 Packaging variable. The inspection sample size for ruggedness, extreme temperature/long term storage, temperature shock, FHC and insensitive munitions only apply when the packaging provisions of the contract (see 5.1) specify the PA125 ammunition container (drawing 12929427). If the packaging provisions of the contract specify a different packout, an alternate sample size for these tests, if applicable, will be included in the contract.

6.10 M242 autogun testing. M242 autogun testing will be conducted from a weapon that conforms to drawing 12524008.

6.11 Submission of alternative conformance provisions. All proposed alternative conformance provisions will be submitted for evaluation and approval. Point of contact can be obtained from U.S. Army ARDEC, AMSRD-AAR-QEM, Picatinny, NJ 07806-5000.

6.12 Definitions.

6.12.1 Action time. Action time is defined as the time period between the initial contact of the weapon firing pin against the primer and the exit of the projectile from the muzzle.

6.12.2 Operational scoring methodology. Operational scoring methodology is defined as at least one of the two observers in the vehicle providing response of successful event.

6.12.3 Flash. Flash is the burning of propellant and its gases in an uncontained area resulting in extremely bright light and high temperatures. Flash could cause dazzle or burns to exposed flesh.

6.13 Muzzle velocity, trace burn time, projectile non-arming and projectile self-destruct function. The minimum muzzle velocity required to achieve the trajectory requirement, the maximum time of flight to 2000 meters (for trace burn time testing), the minimum safe separation distance (for projectile non-arming testing) and the maximum time of flight to 3000 meters (for projectile self-destruct testing) will be determined during design verification and indicated on the top level drawing. Approval of this drawing is required.

6.14 Army Fuze Safety Review Board certification. Certification by the Army Fuze Safety Review Board requires a demonstration that the fuze design meets the requirements of MIL-STD-1316. This task will require design information supported by the test data and analyses. Points of contact for further information on the Army Fuze Safety Review Board certification can be obtained from the US Army RDECOM-ARDEC, AMSRD-AAR-AEP-F, Picatinny, NJ 07806-5000.

6.15 Alternate HEI charge cook off heat block inspection method. A simulated barrel chamber (such as a Mann or autogun barrel with the forward portion/muzzle end removed) may be heated electrically to simulate the heat soak of firing live ammunition. Thermocouples strategically placed on the simulator will be used to note the temperature of the apparatus. The apparatus will be heated to a minimum of 250^{o}C prior to insertion of the test specimen.

6.16 Fragmentation/lethality modeling and analysis. CASRED lethality modeling will be conducted by the US Army Materiel Systems Analysis Activity. Send all pertinent fragmentation test data and information to Director, US Army Materiel Systems Analysis Activity, AMSRD-AMS-CA, 392 Hopkins Road, Aberdeen Proving Ground, MD 21005-5071.

6.17 Army-type designator. The appearance of type designators in contracts, invitation to bid, specifications, drawings, etc. will not in itself constitute official type designation assignment. Only those type designators approved and issued in full accordance with 4.2.4.3 of MIL-STD-1464A will be considered officially assigned. Appropriate nomenclature will be provided following design verification.

6.18 Explanations for Critical Defects.

6.18.1 Primer sensitivity (Table III & Table IV). A primer sensitivity failure at the lowermean critical height could result in accidental initiation while handling, transporting, using, storing or maintaining the ammunition causing severe injury, disability or death to personnel.

6.18.2 Split or perforated case (Critical 1 of Table V). A split case could allow propellant leakage leading to a low propellant situation (see 6.18.3) or expose the User to breech flash during a firing event causing severe injury or disability to the User.

6.18.3 Propellant weight (Critical 2 of Table V). A light propellant charge could result in a projectile remaining inbore situation (see 6.18.9). A heavy propellant charge could result in a fractured

breech that could cause catastrophic weapon failure and expose the User to breech flash causing severe injury or disability to the User.

6.18.4 Primer above flush (Critical 3 of Table V). An above flush primer could cause an accidental initiation while handling, transporting, using, storing or maintaining the ammunition causing severe injury, disability or death to personnel.

6.18.5 Propellant type (Critical 4 of Table V). Use of the wrong propellant could result in a fractured breech that could cause catastrophic weapon failure and expose the User to breech flash causing severe injury or disability to the User.

6.18.6 HEI charge depth (Critical 5 of Table V). A shallow charge depth could result in charge voids during handling. Upon firing, adiabatic compression of voids in the fragmented charge could cause an inbore projectile function which could lead to catastrophic weapon failure creating fragmentation in the vicinity of the User causing severe injury, disability or death to personnel.

6.18.7 Crack or split in projectile (Critical 6 of Table V). A cracked or split projectile could cause an inbore projectile function which could lead to catastrophic weapon failure creating fragmentation in the vicinity of the User causing severe injury or disability to the User.

6.18.8 Fuze not in fully safe configuration (Critical 7 of Table V). An armed fuze could function during handling resulting in an unconfined cartridge initiation, exposing the User to flash and lethal fragmentation causing severe injury, disability or death to the User.

6.18.9 Projectile remaining in bore (Table VI). A projectile remaining in bore could lead to a catastrophic weapon failure upon the next firing cycle creating fragmentation in the vicinity of the User causing severe injury, disability or death to the User.

6.18.10 Premature projectile function (Table VI). A premature projectile function could lead to a catastrophic weapon failure creating fragmentation in the vicinity of the User causing severe injury, disability or death to the User causing severe injury or disability to the User.

6.18.11 Case longitudinal split at K, L, or M (Table VI). A longitudinal split in the case upon firing could expose the User to breech flash causing severe injury or disability to the User.

6.18.12 Case circumferential rupture (complete) (Table VI). Complete circumferential rupture in the case upon firing could expose the User to breech flash causing severe injury or disability to the User.

6.18.13 Case detached metal (Table VI). Detached case metal upon firing could lead to barrel obstruction which would cause catastrophic weapon failure upon the next firing cycle creating fragmentation in the vicinity of the User causing severe injury or disability to the User.

6.19 Design verification safety requirements. The tests outlined in Table II provide supporting data for the Safety Certification used to release the ammunition to the field. Full compliance with the surface danger zone and HEI charge cook off requirements is part of that certification. Failure to meet requirements during design verification testing will invalidate the design.

6.20 Subject term (key word) listing.

M242	Bradley Fighting Vehicle System	Light Armament Vehicle
Ammunition	Medium caliber	PBXN-5
Fuze		

6.21 Revisions/Amendments History. The following is a record of changes incorporated into this document:

ECP	Description	Date Approved
M3Q2028	Initial Release of MIL-C-71139	10 April 1993
M522034	MIL-C-71139 Amendment 1	18 July 1995

6.22 Changes from previous issues. Marginal notations are not used in this revision to identify changes with respect to the previous issues due to the extensiveness of the changes.

Preparing activity:
Army-AR
(Project 1305-2006-009)

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 ASSIST Online database at http://assist.daps.dla.mil.