INCH-POUND

MIL-C-50863C(AR)
26 January 1993
SUPERSEDING
MIL-C-50863B(AR)
3 April 1985

MILITARY SPECIFICATION

CARTRIDGE, 40MM, HEDP, M430A1 LOADING, ASSEMBLING AND PACKAGING

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

1. SCOPE

1.1 This specification covers the requirements, examinations and tests for the loading, assembling and packaging for one type of cartridge designated as Cartridge, 40mm, HEDP, M430A1.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specification, standard and handbooks. The following specifications, standards, and handbooks form a part of this document to the extend specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

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

AMSC N/A FSC 1310

SPECIFICATIONS

MILITARY

MIL-P-116	-Preservation, Methods of
MIL-A-48078	-Ammunition, Standard Quality Assurance Provisions, General Specification for
MIL-P-60942	-Primer Percussion for 40MM Ammunition

STANDARDS

MILITARY

MIL-STD-109	-Quality Assurance Terms and Definitions
MIL-STD-1235	-Single and Multilevel Continuous Samples Procedures and Tables for Inspection by Attributes

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

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

DRAWINGS (See 6.11)

US ARMY ARMAMENT RESEARCH, DEVELOPMENT AND ENGINEERING CENTER (ARDEC)

PRODUCT DRAWINGS

8886405	-Linking of 40MM High Velocity Ammunition
12926811	-Cartridge, 40MM, HEDP, M430A1

PACKAGING DRAWINGS

9362543	-Packing and Marking of Shipping and Storage Container M548 with Linked 40MM Cartridges
12928042	-Packing and Marking of Shipping and Storage Container PA120 with Linked 40MM Cartridges

INSPECTION EQUIPMENT DRAWINGS

9202253	-Chamber Gage
9202254	-Limit
9202255	-Alignment
9202528	-Flush Pin
9202529	-Flush Pin
9202929	-Action Time

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

2.2 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 Material. Materials shall be in accordance with the applicable drawings and specifications.

3.2 Cartridge. The cartridge shall comply with all requirements specified on Drawing (Dwg.) 12926811, all associated drawings, and with all requirements in applicable specifications.

3.3 X-ray examination of fuze assembly, less spitback assembly and prior to assembling to body assembly. The fuze assembly, less spitback assembly, shall be x-rayed for improper assembly, missing, improperly formed or damaged parts and arming or partial arming.

3.4 X-ray examination of ballistic samples. Prior to forwarding the cartridges to the proving ground for ballistic testing, they shall be subjected to x-ray examination.

3.5 Functioning.

3.5.1 Cartridge. The cartridge shall function satisfactorily and the projectile shall have a mean velocity of 790 $\pm$ 10 feet per second (f.p.s.) and a standard deviation not exceeding 12.0 f.p.s. The action time of the cartridge shall be 4.0 milliseconds, maximum. The projectile shall achieve full penetration of 3 1/4 inches mild steel.

3.5.2 Impact functioning. When fired from a MK19 MOD III, Grenade Machine Gun or M129 Grenade Launcher, the projectile assembly upon impact shall function satisfactorily as evidenced by smoke, flash and sound. There shall be no evidence of an early burst (see 6.8.1).

3.5.3 Safety. When fired from the MK19, MOD III, Grenade Machine Gun or M129 Grenade Launcher, the projectile shall not lodge in the bore of the weapon and there shall be no evidence of a premature burst (see 6.8).

3.6 Workmanship. All parts and assemblies shall be fabricated, loaded and assembled in a thorough, workmanlike manner. They shall be free of burrs, sharp edges, cracks, dirt, grease, rust, and other foreign matter. The cleaning method used shall not be injurious to any parts, nor shall the parts be contaminated by the cleaning agents. Exterior surface coatings shall be continuous; however, a few light scratches that do not expose base material may be permitted. All required marking and stamping shall be neat and sharply defined.

4. QUALITY ASSURANCE PROVISIONS

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

4.1.1 Responsibility for compliance. All items shall meet all requirements of Sections 3 and 5. The inspection set forth in the specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

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

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

Quality Conformance Inspection (See 4.4)

4.3 First article inspection. Not applicable.

4.4 Quality conformance inspection.

4.4.1 Inspection lot formation. Inspection lots shall comply with the lot formation provisions of MIL-A-48078. In addition, each inspection lot shall contain:

a. Cartridge case assembly metal parts from one lot interfix number from one manufacturer

b. Metal parts from one lot interfix number from one manufacturer.

c. Fuzes from no more than two (2) consecutively produced serial lots from one manufacturer.

d. Primers from one lot number from one manufacturer.

e. Propellant from not more than one (1) lot number from one manufacturer.

f. A5 from one lot interfix number from one manufacturer.

g. Cartridges in less than full belt quantities shall be handled in the following manner:

(1) If remaining quantity exceeds half the number of rounds in a belt, use rounds from next lot to complete belt.

(2) If remaining quantity is less than half the number of rounds in a belt, include rounds in next lot produced.

(3) Packing box and data cards shall be annotated as to the mixture.

h. Loaded spitback assemblies from one interfix lot number from one manufacturer.

i. Liners and caps from one interfix lot number from one manufacturer.

4.4.2 Examinations and tests.

a. Classification of characteristics. Quality conformance examinations and tests are specified in the following Classification of Characteristics paragraphs. The contractor's quality program or detailed inspection system shall provide assurance of compliance of all characteristics with the applicable drawing and specification requirements utilizing as a minimum the conformance criteria specified. When cited herein, attributes sampling inspection shall be conducted in accordance with Table I below, using the inspection levels stated in the Classification of Characteristics paragraphs.

TABLE I. Attributes sampling inspection

	Inspection Level		
Lot Size	III	IV	V
2 to 8	*	*	5
9 to 15	*	13	5
16 to 25	*	13	5
26 to 50	32	13	5
51 to 90	32	13	13
91 to 150	32	13	13
151 to 280	32	32	20
281 to 500	32	32	20
501 to 1200	80	50	20
1201 to 3200	80	50	32
3201 to 10000	125	50	32
10001 to 35000	125	80	50
35001 to 150000	125	80	50
150001 to 500000	200	125	50
500001 and over	200	125	50

Note: Numbers under inspection levels indicate sample size; Asterisks indicate one hundred percent inspection. If sample size exceeds lot size, perform one hundred percent inspection. Accept on zero failures and reject on one or more failures for all inspection levels.

b. Alternative quality conformance provisions. Unless otherwise specified herein or provided for in the contract, alternative quality conformance procedures, methods or equipment, such as statistical process control, tool control, other types of sampling plans, etc., may be used by the contractor when they provide, as a minimum, the level of quality assurance required by the provisions herein. Prior to applying such alternative procedures, methods or equipment, the contractor shall describe

them in a written proposal submitted to the Government for evaluation (see 6.14). When required, the contractor shall demonstrate that the effectiveness of each proposed alternative is equal to or better than the specified quality conformance provision(s) herein. In case of dispute as to whether the contractor's proposed alternative(s) provides equivalent assurance, the provisions of this specification shall apply. All approved alternative provisions shall be specifically incorporated into the contractor's quality program or inspection system, as applicable.

CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET	DRAWING NUMBER
4.4.2.1	Cartridge Case Assembly, Prior to Loading	1 OF 1	8886327
			NEXT HIGHER ASSEMBLY: 9287851

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
CRITICAL				
1.	Closing cup missing	100%	3.2	Probe
2.	Three (3) or more vent holes blocked or missing	100%	3.2	Gage
MAJOR				
101.	Propellant weight		3.2	4.5.2
102.	Propellant weight (alternate method)		3.2	4.5.3
103.	One (1) or two (2) vent holes blocked or missing	100%	3.2	Gage
MINOR	None defined.			

NOTES:

QUALITY CONFORMANCE INSPECTION

CLASSIFICATION OF CHARACTERISTICS

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PARAGRAPH	TITLE	SHEET	DRAWING NUMBER
4.4.2.2	Cartridge Case Assembly, Prior to Inserting Base Plug and Primer	1 OF 1	8886327
			NEXT HIGHER ASSEMBLY 9287851

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
CRITICAL				
1.	Propellant charge weight obviously incorrect (see 6.10)	100%	3.2	Probe
MAJOR				
101.	Propellant charge weight obviously incorrect (see 6.10)	100%	3.2	Visual
MINOR	None defined.			

NOTES:

AMSMC Form 1570b, 1 Jul 89

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

CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET 1 OF 1	DRAWING NUMBER 8886327
4.4.2.3	Cartridge Case Assembly		NEXT HIGHER ASSEMBLY 9287851

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
CRITICAL				
1.	Primer above flush with base plug	100%	3.2	Gage
MAJOR				
101.	Security of crimp of base plug and action time	See 4.5.4	3.2 & 3.5.1	9202929
102.	Base plug above flush	Level III	3.2	9202528
103.	Depth of base plug, max.	Level III	3.2	9202528
104.	Depth of primer from base plug, max.	Level III	3.2	9202529
105.	Primer damaged	Level III	3.2	Visual
106.	Excessive sealing compound on exterior surface of primer	Level III	3.2	Visual
MINOR				
201.	Evidence of poor workmanship	Level V	3.6	Visual

NOTES:

CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET 1 OF 1	DRAWING NUMBER
4.4.2.4	Fuze, PIBD, M549; Less Spitback Assembly		9287861
			NEXT HIGHER ASSEMBLY 9287852

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
CRITICAL				
1.	X-ray examination 1/	100%	3.3	4.5.5
SPECIAL				
a.	X-ray examination 1/	100%	3.3	4.5.5
MAJOR				
101.	X-ray examination 2/	100%	3.3	4.5.5
102.	Pushout test of spitback assembly	3/	3.2	4.5.15
MINOR	None defined.			

NOTES:

AMSMC Form 1570b, 1 Jul 89

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

NOTES

1/ Critical Defect is defined as:

a. Setback pin protrusion short
b. Setback pin missing
c. Setback spring missing
d. O-ring missing
e. Pinion Assembly missing
f. Verge Assembly missing
g. Rotor gear assembly in armed or partially armed position
h. Safety spring missing
i. Drive screw missing

Special Defect is defined as:

a. Safety Spring end not in contact with root diameter surface or seated within root between first 2 teeth of rotor gear

b. Drive screw not seated.

2/ The fuze image shall be automatically evaluated by an automatic fuze x-ray machine, the fuze shall be inspected for the Critical and Special Defects above and the following Major Defects:

a. Safety spring weight missing, cocked or out of position
b. Setback spring not level or leg bent.
c. Actuator missing, not fully seated, inverted or more than one present.
d. Foreign material present.

The region of interest to be evaluated for each critical, special and major defect above shall be submitted to the Government for approval (see 4.5.5).

3/ Two (2) samples shall be selected from every four (4) hours production. If any sample fails the drawing requirement, the 4 hours production represented by the sample shall be rejected and not used in production.

CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET 1 OF 1	DRAWING NUMBER
4.4.2.5	Body Loading Assembly		9287853
			NEXT HIGHER ASSEMBLY 9287852

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
Critical	None defined			
MAJOR				
101.	Specific gravity of A5	*	3.2	4.5.8
102.	Depth to liner	Level III	3.2	Gage
103.	Diameter of rotating bands	Level III	3.2	Gage
104.	True position of liner	Level III	3.2	Gage
105.	Cap missing, loose or torn exposing explosive	Level III	3.2	Visual
MINOR				
201.	Threads damaged	Level IV	3.2	Visual
202.	Evidence of poor workmanship	Level V	3.6	Visual

NOTES:
*Two (2) cup assemblies shall be selected from each 4 hours production. If any sample fails, the 4 hours production shall be rejected.

CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET	DRAWING NUMBER
4.4.2.6	Projectile Assembly	1 OF 1	9287852
			NEXT HIGHER ASSEMBLY 9287851

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
Critical	None defined			
MAJOR				
101.	Concentricity of rotating bands with outside diameter of fuze	Level III	3.2	Gage
102.	Gap, min. between fuze and body	Level III	3.2	Gage
103.	Security of fuze, prior to sealant cure	1/	3.2	4.5.6
104.	Disassembly torque of fuze	4.5.7	3.2	4.5.7
MINOR				
201.	Evidence of poor workmanship	Level V	3.6	Visual

NOTES:
1/ CSP-2, Code Letter K, AQL 0.40% of MIL-STD-1235.

AMSMC Form 1570b, 1 Jul 89

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

CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET 1 OF 1	DRAWING NUMBER 9287851
4.4.2.7	Projectile, Prior to Assembling to Cartrige Case Assembly		NEXT HIGHER ASSEMBLY

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
Critical	None defined			
MAJOR				
101.	O-ring (packing) missing in groove	Level III	3.2	Visual
MINOR	None defined.			

NOTES:

AMSMC Form 1570b, 1 Jul 89

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

CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET 1 OF 2	DRAWING NUMBER
4.4.2.8	Cartridge, 40MM, HEDP, M430A1		12926811
			NEXT HIGHER ASSEMBLY

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
Critical				
1.	X-ray examination of ballistic samples 1/	0-1	3.4	4.5.13
MAJOR				
101.	X-ray examination of ballistic samples 2/ 3/		3.4	4.5.13
102.	Pull test of projectile	4/	3.2	4.5.9
103.	Air pressure	4.5.12	3.2	4.5.12
104.	Chamber gage failure	100%	3.2	9202253, 9202254, 9202255
105.	Total length	100%	3.2	4.5.10
106.	O-ring exposed to the extent the cartridge would fail the air test at case to projectile joint and/or chamber gage test.	Level III	3.2	Visual
107.	Gap, rear of rotating band	Level III	3.2	Gage

NOTES: 1/ Critical defect:
a. Closing cup missing.
b. Low propellant charge
c. Any critical defect listed in Note 1/ of paragraph 4.4.2.4.

2/ Major defect: All defects not listed in Note 1/ above.

3/ Any major defect found shall be reported.

4/ One (1) sample shall be selected from every thirty (30) minutes production. If the sample fails the drawing requirement, the thirty (30) minutes of production represented by the sample shall be rejected.

CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET	DRAWING NUMBER
4.4.2.8	Cartridge, 40MM, HEDP, M430A1	2 OF 2	12926811
			NEXT HIGHER ASSEMBLY

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
	Functioning Tests			
5/	Functioning MK19, MOD III, Machine Gun- Single shot	144 samples 5/	3.5.1/ 3.5.2	4.5.16
5/	MK19, MOD III, Machine Gun- Rapid fire	32 or 48 samples as applicable 5/		4.5.18
5/	M129 Grenade Launcher Mild Steel	72 samples 5/	3.5.1/ 3.5.2	4.5.16
	M129 Grenade Launcher RHA (info only)	6/		

NOTES: 5/ See Table II for defect classification and acceptance/rejection criteria.
6/ 10 samples from every 5th lot produced shall be fired against a vertical 3 inch thick RHA plate. Depth of penetration of each sample shall be recorded for information only and included in the ballistic test report for that lot.

CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET 1 OF 1	DRAWING NUMBER
4.4.2.9	Linked Ammunition, Prior to Packing		8886405
			NEXT HIGHER ASSEMBLY

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
Critical				
1.	Link improper (any one of the four (4) tabs of link not in groove; link inverted; link damaged; link distorted	100%	3.2	Visual
MAJOR	None defined			
MINOR	None defined.			

NOTES:

CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET 1 OF 1	DRAWING NUMBER
4.4.2.10	Unsealed Shipping and Storage Container		12928042 or 9362543
			NEXT HIGHER ASSEMBLY

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
Critical	None defined			
MAJOR				
101.	Cartridge inverted	Level III	3.2	Visual
102.	Incorrect number of cartridges	Level III	3.2	Visual
103.	Fillers missing	Level III	3.2	Visual
104.	Support, top or bottom, missing (when applicable)	Level III	3.2	Visual
105.	Spacer missing	Level III	3.2	Visual
106.	Top pad missing (when applicable)	Level III	3.2	Visual
MINOR	None defined			

NOTES:

QUALITY CONFORMANCE INSPECTION

CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET	DRAWING NUMBER
4.4.2.11	Sealed Shipping and Storage Container	1 of 1	12928042 or 9362543
			NEXT HIGHER ASSEMBLY

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
Critical	None defined			
MAJOR				
101.	Box or container damaged	Level III	3.2	Visual
MINOR				
201.	Contents loose	Level V	3.2	Manual
202.	Can seal missing or improperly positioned	Level V	3.2	Visual
203.	Marking misleading or unidentifiable	Level V	3.2	Visual

NOTES:

TABLE II. QUALITY CONFORMANCE INSPECTION
FUNCTIONING & DEFECT CLASSIFICATION AND ACCEPTANCE/REJECTION CRITERIA

DEFECT	ACCEPTANCE NUMBER				REJECTION NUMBER				CLASSIFICATION
	MK19 Single Shot	MK19 Rapid Fire	M129	MK19 Single Shot and M129	MK19 Single Shot	MK19 Rapid Fire	M129	MK19 Single Shot and M129	
I. PAD PHASE									
a. Failure to meet average velocity	1/	-	-	-	2/	-	-	-	MAJOR
b. Standard deviation of velocity over max (see 3.5.1)	1/	-	-	-	2/	-	-	-	MAJOR
II. PLATE PHASE									
a. Incomplete penetration	-	-	4	-	-	-	5	-	MAJOR
b. Low order occurrence	-	-	3/	-	-	-	3/	-	MAJOR
III. COMBINED PHASES									
a. Impact functioning failure (see 3.4.3)	-	-	-	5	-	-	-	6	MAJOR
b. Low order occurrence	-	-	-	2	-	-	-	3	MAJOR

NOTES:

1/ Lot acceptable if requirement is met.
2/ Lot rejected if requirement is not met.
3/ Lot rejected if two (2) or more low orders occur, if one low order occurs a second sample of seventy-two (72) rounds shall be selected and fired. If the combined number of low orders in the first and second sample is two (2) or more the lot shall be rejected.

TABLE II. QUALITY CONFORMANCE INSPECTION
FUNCTIONING & DEFECT CLASSIFICATION AND ACCEPTANCE/REJECTION CRITERIA

DEFECT	ACCEPTANCE NUMBER				REJECTION NUMBER				CLASSIFICATION
	MK19 Single Shot	MK19 Rapid Fire	M129	MK19 Single Shot and M129	MK19 Single Shot	MK19 Rapid Fire	M129	MK19 Single Shot and M129	
c. Primer leak as evidenced by perforation of primer cup or smoke deposit on base plug or cartridge case	0	0	0	0	1	1	1	1	MAJOR
d. Projectile lodges in bore (see 3.5.3)	0	0	0	0	1	1	1	1	Critical
e. Premature burst (see 3.5.3)	0	0	0	0	1	1	1	1	Critical
f. Early Burst (see 3.5.2)	0	0	0	0	1	1	1	1	Major
g. Primer Misfire	1	1	1	1	2	2	2	2	Major
h. Weapon Stoppage excluding primer misfire	0	-	0	0	1	-	1	1	Major

4.4.3 Functioning, regular production. If the launcher is suspected of being the cause of rejection for the mean velocity and standard deviation phase, sufficient cartridges from a controlled lot shall be fired from the same approved launcher. If there is significant difference in the standard deviation and mean velocity of the control lot from that previously obtained for control rounds, then a new approved launcher shall be obtained and the lot of ammunition retested. If all cartridges function properly on original test, then only the velocity will be considered on retest. If there is no significant difference in the standard deviation or mean velocity of the control lot, then the lot shall be rejected.

4.4.3.1 Rapid fire functioning. One (1) full metal can shall be randomly selected from a completed linked lot and subjected to this test. The lot shall be rejected if any projectile sticks in the gun bore or a premature burst occurs in the gun bore or in flight. Gun stoppage shall be reported for informational purposes.

4.4.4 Inspection equipment. The inspection equipment required to perform the inspections specified herein is identified in the "Inspection Method Reference" column of the Classification of Characteristics listings starting with 4.4.2.1. Contractor inspection equipment designs shall be submitted for Government approval as specified in the contract. Designs which provide variable measurements instead of attributes data are preferred in order to facilitate the use of statistical process control. See MIL-A-48078 and 6.3 herein.

4.5 Methods of inspection.

4.5.1 Check test for deterioration of primers. If the total time between original acceptance of any lot and the assembly of that lot into the cartridge exceeds two years, or if the primers have been subjected to adverse conditions; however brief, at any time since previous tests, the primer lot shall be subjected to and must satisfactorily pass the check test for deterioration specified in MIL-P-60942 immediately before the primer lot is assembled into the cartridge. This test shall be performed by the contractor on primers selected by the Government inspector at the facility assembling the primers into the cartridge (see 6.6).

4.5.2 Propellant weight of case, cartridge. The propellant weight shall be determined and then check weighed 100 percent. The check weighing shall be accomplished independently of the original weighing or determination, using a different balance from that used to make the original weighing and if performed manually, shall be performed by another operator. Any charge which fails to comply with the requirement specified on the applicable drawing shall be classified defective and removed from the lot.

4.5.3 Propellant weight of case, cartridge alternate method. During production, every propellant charge shall be weighed or volumetrically loaded. Those failing to comply with the requirements specified by the applicable drawing shall be classified defective and removed from the lot. At the start of production, 380 consecutive samples per station, per machine, shall be selected and check weighed 100 percent. All samples shall comply with the applicable drawing requirement. If all samples comply with the applicable drawing requirement, 5 samples per station, for every 2 hours production, shall be selected and the weight of each of the 5 samples must meet the applicable drawing requirement. If any weight fails the applicable drawing requirement, the 2 hours production represented by that sample shall be rejected. Correction will be made and 380 consecutive samples check weighed from that station, If all samples meet the applicable requirement, sampling every 2 hours shall be resumed.

4.5.4 Security of crimp of base plug and action time. Five (5) cartridge case assemblies shall be randomly selected every four (4) hours from each manual primer assembly machine or twenty (20) cartridge case assemblies shall be randomly selected every four (4) hours from each automatic primer assembly machine. These assemblies shall be assembled to a projectile and fired for test of "security of crimp of base plug and action time" determination. The cartridge case assemblies produced by each primer assembly machine shall be kept segregated and identified. They shall not be used in production until successful completion of this test. If any base plug moves more than .005 above flush with rear of case, or the action time of any cartridge case assembly exceeds 4.0 milliseconds, the four (4) hours production, represented by the samples, from each manual primer assembly machine or each automatic primer assembly involved shall be rejected.

4.5.5 X-ray examination of fuze assemblies, less spitback assembly and prior to assembling to body assembly. Improperly assembled, missing, improperly formed parts, armed or partially armed fuze assemblies shall be determined by x-ray equipment or any other method satisfactory to the contacting officer. This test shall be conducted in two (2) planes. From the top of the fuze assembly down and from the side. Side view shall show the flange of the setback pin seated against the bottom surface of the rotor plate. The equipment shall be in accordance with Dwg. 9280437.

4.5.6 Security of fuze on projectile assembly. The projectile assembly shall be placed in an approved fixture and the torque specified on the applied drawing shall be applied. Observation shall be made for the applicable requirement. This test is a non-destructive test. Parts so tested may be returned to the lot.

WARNING: This test is conducted on assemblies containing an explosive element. Test barricades (where used), procedures and equipment shall have prior approval.

4.5.7 Disassembly torque of fuze on projectile assembly. Two (2) projectile assemblies shall be selected from each five gallon container (45 lbs) of adhesive and held for 24 hours, after which each of the selected projectile assemblies shall be placed in an approved fixture and subjected to this test. If any projectile assembly fails to comply with the applicable requirement, the container of adhesive shall not be used in production and any projectile assembly using that adhesive shall be rejected.

WARNING: This test is conducted on assemblies containing an explosive element. Test barricades (where used), procedures and equipment shall have prior approval.

4.5.7.1 Alternate sealant test. When the alternate sealant is applied, two (2) projectile assemblies shall be selected from each four (4) hours production and held until sealant is cured, after which each of the projectile assemblies shall be placed in an approved fixture and subjected to this test. If any projectile assembly fails to comply with the drawing requirement, the four (4) hours production represented by the sample shall be rejected and not used in production.

WARNING: This test is conducted on assemblies containing an explosive element. Test barricades (where used), procedures and equipment shall have prior approval.

4.5.8 Specific gravity of A5. This test shall be conducted by any method approved by the Contracting Officer.

4.5.9 Pull test of projectile. The cartridge shall be placed in an approved fixture and the axial tension specified on the applicable drawing shall be applied. Cartridge case assemblies may be reused after undergoing a Government approved rework. Projectile assemblies may be reused. The cartridge shall be pulled until separation occurs and the data recorded.

WARNING: This test is conducted on assemblies containing an explosive element. Test barricades (where used), procedures and equipment shall have prior approval.

4.5.10 Total length. Using approved equipment, the cartridge must meet the requirement specified on the applicable drawing.

4.5.11 Chamber gage failure. The cartridge shall be placed in the chamber gage and must meet the requirement specified on the applicable drawing.

4.5.12 Air pressure. The cartridge shall be placed in an approved fixture and a measured quantity of air shall be applied to produce the required air pressure. Fourteen (14) samples shall be selected from every thirty (30) minutes of production. The last sample shall be air tested. If it is acceptable, the thirty (30) minutes of production shall be considered acceptable; and the samples will be returned to the lot. If the sample is unacceptable, the remaining thirteen (13) samples shall be air tested. If no failure occurs the thirty (30) minutes of production shall be considered acceptable. If one (1) or more failures occur, the thirty (30) minutes of production shall be rejected and segregated from the lot.

4.5.13 X-ray examination of ballistic samples. Prior to forwarding the cartridges to the proving ground for ballistic testing, they shall be x-rayed for critical and major defects using approved x-ray equipment or any other method satisfactory to the Contracting Officer. This test shall be conducted in two planes. From the top of the fuze assembly down and from the side. If any critical defect is found, the lot shall be rejected including the ballistic sample. If major defect is found, it shall be reported and the sample forwarded to the proving ground.

4.5.14 Heat seal test of packing seals. This test shall be conducted in accordance with MIL-P-116.

4.5.15 Push-out test of spitback assembly. The spitback assembly shall be crimped to a bottom plate, placed in an approved fixture and subjected to this test. Observation shall be made for the requirement of the applicable drawing.

WARNING: This test is conducted on assemblies containing an explosive element. Test barricades (where used), procedures and equipment shall have prior approval.

4.5.16 Functioning. This test shall be conducted at a Government owned proving ground. If the skin temperature of the case is not between 45°F and 90°F, the rounds being tested shall be temperature conditioned at 70°F for at least two (2) hours, then fired within fifteen (15) minutes after being removed from temperature soak. The test rounds shall be fired at a rate not to exceed ten (10) rounds per minute using an approved 40mm grenade. launcher. The launcher shall have been "broken-in" if new,

with at least forty (40) rounds and placed on an approved mount for running the test. At least 6 gun-warmers shall be rapid fired at the start of the test. Distance to impact 200 meters plus or minus (±) 5 meters. Impact media, coarse sand, ten (10) inches minimum thickness at point of impact. Rake sand as required such that individual impact craters do not overlap. Sand will be raked after each dud. If a round falls outside the specified impact area it shall be declared a "no-test" round. The velocity shall be measured at 30 feet from the muzzle of the launcher and check measured at the same base line. The monitoring devices and time recorders shall be a dual system setup for recording two (2) separate readings and shall be within 3 feet per second. If the two (2) readings differ more than 3 feet per second (individual shots), the results shall be discarded and another round fired in its place. When proving ground reports results for functioning, the number of all "no test" rounds shall also be reported. "No-test" rounds shall be reported as "no-test" rounds outside the impact area or "no-test" rounds for velocity readings. Observations shall be made for functioning and results calculated and recorded for (a) cartridge action time, and (b) mean velocity and standard deviation (see 6.7). An outlier shall be permitted up to ± 25 percent of the mean velocity of the lot. No more than one value on the high side and no more than one value on the low side shall be omitted from the mean velocity and standard deviation calculations. If a velocity value is greater than ± 25 percent of the mean velocity of the lot, the lot shall be rejected.

Armor Plate. The cartridge shall be fired against and fully penetrate a vertical 3 1/4 inch mild steel plate. Distance to impact 200 feet. Traverse weapons between shots so that impacts are not overlapping.

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

4.5.17 Movement of base plug. The movement of the base plug shall be measured from the highest point on the base plug to a point on cartridge case directly beside it, radially.

4.5.18 Rapid fire functioning. This test shall be conducted at a Government owned proving ground. One (1) full metal can shall be rapid fired from the MK19, MOD III, Grenade Launcher. These rounds shall be fired in bursts of five (5) to ten (10) rounds. Observation shall be made for gun stoppage (info only), projectile stuck in gun bore or premature burst in gun bore or in flight.

5. PACKAGING

5.1 Preservation and packaging.

5.1.1 Level A. Preservation and packaging shall be in accordance with Dwg. 12928042 or 9362543 as applicable.

5.2 Packing.

5.2.1 Level A. The linked cartridge assembly shall be packed in accordance with Dwg. 12928042 or 9362543 as applicable.

5.3 Marking. Marking shall be in accordance with Dwg. 12928042 or Dwg. 9362543 as applicable.

5.4 Shipping. When components from more than one lot are shipped as a carload, each lot shall be kept separate, and the division between lots clearly indicated to prevent mixing of the lots in transit.

5.5 Palletizing. Palletization shall be as described on Dwg. 12928042 or 9362543 as applicable.

6. NOTES

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

6.1 Intended use. This specification covers the metal parts and loading, assembling and packing for Cartridge, 40mm, HEDP, M430A1.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number and date of this specification.

b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.2).

c. Requirements for submission of first article sample.

d. Applicable stock number.

e. Packaging requirements, if other than specified in Section 5.

f. Serialization requirements, if applicable.

6.3 Submission of contractor inspection equipment designs for approval. Submit copies of designs as required to: Commander, U.S. Army ARDEC, ATTN: SMCAR-QAF-I, Picatinny Arsenal, NJ 07806-5000. The region of interest to be evaluated by the automatic Fuze Inspection Radiography System, for each critical, special and major defect shall be submitted to: Commander, U.S. Army Armament, Munitions and Chemical command, ATTN: SMCAR-QAH, Picatinny Arsenal, NJ 07806-5000, for approval. This address will be specified on the Contract Data Requirements List, DD Form 1423 in the contract.

6.4 Submission of results of contractor-conducted examinations and tests. Unless otherwise specified by the Contracting Officer, the contractor shall forward requested records of examination or tests to Commander, ARDEC, ATTN: SMCAR-CCL and SMCAR-QAF-S, Picatinny Arsenal, NJ 07806-5000.

6.5 Submission of test data. In addition to the normal distribution of records, when the cartridges are procured by AMCCOM, one (1) copy of all ballistic data and ammunition data cards shall be forwarded to: Commander, ARDEC, ATTN: SMCAR-CCL and SMCAR-QAF-S, Picatinny Arsenal, NJ 07806-5000.

6.6 Cost of check test. The Contracting Officer will arrange for the contractor to be reimbursed for the expense incurred in the performance of the check test for deterioration of the primer assemblies. The tests shall be conducted at government expense without cost to the contractor who loaded the primer assemblies into the cartridge and shall not constitute a basis for rejection against either contractor except where deterioration has occurred as a direct result of carelessness in handling, storage, etc., permitted while the primer assembly lot was under the jurisdiction of either contractor (when applicable).

6.7 Standard deviation formula. Standard deviation shall be calculated from the following formula.

$$S = \sqrt{\frac{\Sigma (X-\bar{X})^2}{n-1}}$$

Where: X = each individual value

$\bar{X}$ = sample arithmetic mean $\frac{\Sigma X}{n}$

n = sample size

$(X - \bar{X})$ = the sum of the squares of the differences between the sample mean and each individual value

6.7.1 Alternate standard deviation formula. For a faster and easier method of arriving at the standard deviation formula, the following alternate method may be used:

$$S = \sqrt{\frac{n \sum X^2 - (\sum X)^2}{n \quad (n-1)}}$$

Other approved standard deviation formulas may be used.

6.8 Premature burst. A premature burst is considered to have occurred if the projectile functions in gun bore or in flight up to a distance of 125 feet from the launcher.

6.8.1 Early burst. An early burst is considered to have occurred if the projectile functions in flight beyond a distance of 125 feet from the launcher.

6.9 Combining of proving ground tests. When the contractor for the cartridge is also the contractor for one or more of the components thereof, the proving ground tests of the contractor may be combined with the proving ground test of the cartridge, to save expense, upon agreement between the procuring activity and the contractor. In cases where the cartridge specification does not cover all of the proving ground tests specified for the component, the additional tests specified in the component specification shall be conducted.

6.10 Propellant charge weight. If any cartridge case, prior to insertion of the base plug and primer, is suspected of containing an underweight or overweight propellant charge, based on probe inspection, it will be removed from the lot and weighed on suitable scales. Any cartridge case found with less than 75 percent or more than 125 percent of the assessed propellant load will be classified as a critical defect and removed from the lot. Any cartridge case found to have a propellant weight out of drawing tolerance but within ±25 percent of the assessed propellant load will be classified as a major defect and removed from the lot.

6.11 Drawings. Drawings listed in Section 2 of this specification under the heading U.S. Army Armament, Research, Development and Engineering Center (ARDEC) may also include drawings prepared by, and identified as U.S. Army Armament, Research and Development command (ARRADCOM), Frankford Arsenal, Rock Island Arsenal or Picatinny Arsenal drawings. Technical data originally prepared by these activities is now under cognizance of ARDEC.

6.12 Proving ground test summary:

TEST	SAMPLE SIZE	REQUIREMENTS
Functioning		
(1) Regular Production	216 Total 72 Plate (M129 GL) 144 Sand (MK19, MOD III, GL)	See 3.5 and 4.4.3
(2) Info Tests		
a. Rapid Fire	1 Full Metal Can	4.4.3.1
b. Penetration	10 samples every 5th lot	4.4.2.8

6.13 Subject term (key word) listing.

Automated Fuze Radiograph System
High Explosive Dual Purpose
MK19 MOD 3 Grenade Machine Gun
M548 Shipping and Storage Container
PA120 Shipping and Storage Container

6.14 Submission of alternative quality conformance provisions. Unless otherwise specified in the contract, proposed alternative quality conformance provisions will be submitted by the contractor for evaluation by the technical activity responsible for the preparation of this specification.

6.15 Changes from previous issue. Marginal Notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodian:
Army-AR

Preparing activity
Army-AR

(Project 1310-A525)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

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

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER	2. DOCUMENT DATE (YYMMDD)
	MIL-C-50863C	26 January 1993

3. DOCUMENT TITLE: CARTRIDGE, 40MM, HEDP, M430A1, LOADING ASSEMBLING AND PACKING

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets if needed.)*

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME	b. TELEPHONE (Include Area Code)	
U. S. Army ARDEC Specifications And Standardization Office/Bldg. 6	(1) Commercial (201) 724-6675	(2) AUTOVON 880-6675
c. ADDRESS (Include Zip Code) ATTN: SMCAR-BAC-S Picatinny Arsenal, N. J. 07806-5000	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	