

MIL-C-50863B (AR)
3 April 1985
SUPERSEDING
MIL-C-50863A (AR)
29 March 1976

MILITARY SPECIFICATION

CARTRIDGE, 40MM, HEDP, M430 LOADING, ASSEMBLING AND PACKAGING

This specification is approved for use by the US 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 loading, assembling and packaging for one type of cartridge designated as Cartridge, 40MM, HEDP, M430.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specification and standards. Unless otherwise specified (see 6.2), the following specifications and standards of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitations, form a part of this specification to the extent specified herein.

SPECIFICATIONS

MILITARY

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

FSC 1310

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, US Army Armament Research and Development Center, Attn: AMSMC-QA, Dover, New Jersey 07801-5001 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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STANDARDS

MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
- MIL-STD-331 - Fuze and Fuze Components, Environmental and Performance Tests for
- MIL-STD-1235 - Single and Multilevel Continuous Samples Procedures and Tables for Inspection By Attributes

2.1.2 Other Government documents, drawings and publications.
The following other Government documents form a part of this specification to the extent specified herein:

DRAWINGS (SEE 6.11)

U.S. ARMY ARMAMENT RESEARCH AND DEVELOPMENT CENTER (ARDC)

PRODUCT AND PACKING DRAWINGS

- 8796522 - Marking for Packing Containers
- 8886405 - Linking of 40MM Hi Velocity Ammunition
- 9251995 - Box, Wirebound, Packing, Ammunition for Cartridge, 40MM, Linked
- 9251996 - Box, Fiber, Packing, Ammunition for Cartridge, 40MM, Linked
- 9287851 - Cartridge, 40MM, HEDP, M430
- 9362543 - Packing and Marking of Shipping and Storage Container M548 with Linked 40MM Cartridges

INSPECTION EQUIPMENT DRAWINGS

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

CODE OF FEDERAL REGULATIONS

- TITLE 49 - Transportation, Parts 100-199

(The Code of Federal Regulations is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Orders should specify "49 CFR 100-199 (latest revision)").

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(Copies of specifications, standards, handbooks, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.1.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

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.) 9287851, all associated drawings, and with all requirements in applicable specifications.

3.3 X-Ray examination of fuze assemblies prior to assembling to body assembly. The fuze assembly shall be x-rayed for improperly assembled, missing parts, armed or partially armed (as evidenced of the setback pin flange seated against bottom surface of the rotor plate counterbore).

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 2 1/2 inch mild steel.

3.5.2 Safety. There shall be no premature burst (See 6.8) or evidence thereof in any of the test firings.

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 not exposing base material may be permitted. All required marking and stamping shall be neat and sharply defined.

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4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection and standard quality assurance provisions. Unless otherwise specified herein or in the contract, the provisions of MIL-A-48078 shall apply and are hereby made a part of this detail specification.

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. Fuze 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 25 rounds, use rounds from next lot to complete belt.

(2) If remaining quantity is less than 25 rounds, include rounds in next lot produced.

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

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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 Examination. See MIL-A-48078.

a. Sampling plans. Unless otherwise specified in the Classification of Defects and Test Tables, sampling plans for major and minor defects shall be in accordance with MIL-STD-105, Inspection Level II.

QUALITY CONFORMANCE INSPECTION

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CLASSIFICATION OF DEFECTS & TESTS

PARAGRAPH	TITLE	SHEET 1 OF 1		DRAWING NUMBER
				8886327
				NEXT HIGHER ASSEMBLY
				9287851
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH
				PARAGRAPH REFERENCE / INSPECTION METHOD
4.4.2.1	Cartridge Case Assembly, Prior to Loading			
<u>CRITICAL</u>	None defined			
<u>MAJOR</u>	Closing cup missing		100%	3.2
101.	Propellant weight			3.2
102.	Propellant weight (alternate method)			3.2
103.				Visual
<u>MINOR</u>	None defined			4.5.2
				4.5.3
NOTES				

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CLASSIFICATION OF DEFECTS & TESTS

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PARAGRAPH	TITLE	SHEET 1 OF 1		DRAWING NUMBER
CATEGORY	EXAMINATION OR TEST	AQL OR 100%	REQUIREMENT PARAGRAPH	NEXT HIGHER ASSEMBLY
				PARAGRAPH REFERENCE / INSPECTION METHOD
4.4.2.2	Cartridge Case Assembly, Prior to Inserting Base Plug and Primer			8886327
				9287851
<u>CRITICAL</u>				
1.	Spilled propellant from cartridge case	100%	3.2	Visual
2.	Propellant charge weight obviously incorrect (See 6.10)	100%	3.2	Visual
<u>MAJOR</u>				
101.	Propellant charge weight obviously incorrect (See 6.10)	100%	3.2	Visual
<u>MINOR</u>				
	None defined			
notes:				

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CLASSIFICATION OF DEFECTS & TESTS

PARAGRAPH	TITLE	SHEET	1 of 1	DRAWING NUMBER
4.4.2.3	Cartridge Case Assembly			8886327
				NEXT HIGHER ASSEMBLY
				9287851
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH
<u>CRITICAL</u>				
1.	Primer above flush with base plug		100%	3.2
<u>MAJOR</u>				
101.	Security of crimp of base plug and action time			3.2 & 3.5.1
102.	Base plug above flush		0.40%	3.2
103.	Depth of base plug, max.		0.40%	3.2
104.	Depth of primer from base plug, max.		0.40%	3.2
105.	Primer damaged		0.40%	3.2
106.	Excessive sealing compound on exterior surface of primer		0.40%	3.2
<u>MINOR</u>				
201.	Evidence of poor workmanship		0.65%	3.6
				Gage
				4.5.4 (9202929)
				9202528
				9202528
				9202529
				Visual
				Visual
				Visual

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CLASSIFICATION OF DEFECTS & TESTS

PARAGRAPH	TITLE	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	SHEET 1 OF 1	DRAWING NUMBER 9287860 NEXT HIGHER ASSEMBLY 9287852 PARAGRAPH REFERENCE / INSPECTION METHOD
4.4.2.4	Fuze, PIBD, M549						
CATEGORY							
<u>CRITICAL</u>	None defined						
<u>MAJOR</u> 101. 102.	X-ray examination Pushout test of spitback assembly		See Note	100% See Note	3.3 3.2		4.5.5 4.5.15
<u>MINOR</u>	None defined						
<u>Notes:</u> 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.							

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CLASSIFICATION OF DEFECTS & TESTS

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PARAGRAPH	TITLE	SHEET 1 of 1		DRAWING NUMBER 9287853	
				NEXT HIGHER ASSEMBLY 9287852	
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
4.4.2.5	Body Loading Assembly				
<u>CRITICAL</u>	None defined				
MAJOR					
101.	Specific gravity of A5	*	*	3.2	4.5.8
102.	Depth to liner		0.40%	3.2	Gage
103.	Diameter of rotating bands		0.40%	3.2	Gage
104.	Parallelism of liner		0.40%	3.2	Gage
105.	Cap missing, loose or torn exposing explosive		0.40%	3.2	Visual
MINOR					
201.	Threads damaged		0.65%	3.2	Visual
202.	Evidence of poor workmanship		0.65%	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.				

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CLASSIFICATION OF DEFECTS & TESTS

PARAGRAPH	TITLE	SHEET 1 of 1		DRAWING NUMBER 9287852
CATEGORY	EXAMINATION OR TEST	AQL OR 100%	REQUIREMENT PARAGRAPH	NEXT HIGHER ASSEMBLY 9287851
				PARAGRAPH REFERENCE /INSPECTION METHOD
4.4.2.6	Projectile Assembly			
<u>CRITICAL</u>	None defined			
MAJOR 101.	Concentricity of rotating bands with outside diameter of fuze	0.40%	3.2	Gage
102.	Gap, min. between fuze and body	0.40%	3.2	Gage
103.	Security of fuze, prior to sealant cure	See Note	3.2	4.5.6
104.	Disassembly torque of fuze	4.5.7	3.2	4.5.7
MINOR 201.	Evidence of poor workmanship	0.65%	3.6	Visual
notes: CSP-2, Code Letter K, AQL .040% of MIL-STD-1235.				

CLASSIFICATION OF DEFECTS & TESTS

PARAGRAPH	TITLE	SHEET 1 OF 1		DRAWING NUMBER 9287851
4.4.2.7	Projectile, Prior to Assembling to Cartridge Case Assembly			NEXT HIGHER ASSEMBLY
CATEGORY	EXAMINATION OR TEST	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
<u>CRITICAL</u>	None defined			
<u>MAJOR</u>	None defined			
<u>MINOR</u> 201.	O-ring (packing) missing in groove	0.65%	3.2	Visual
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PARAGRAPH	TITLE	SHEET 1 of 1		DRAWING NUMBER 9287851	NEXT HIGHER ASSEMBLY
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
4.4.2.8	Cartridge				
CRITICAL					
1.	X-ray examination of ballistic samples				4.5.13
MAJOR					
101.	Pull test of projectile	80	1-2	3.2	4.5.9
102.	X-ray examination of ballistic samples			3.2	4.5.13
103.	Air pressure	200	7-8	3.2	4.5.12
104.	Chamber gage failure		100%	3.2	9202253 4.5.11
					9202254
					9202255
105.	Total length		100%	3.2	9202658
106	O-ring exposed		0.40%	3.2	4.5.10
107.	Gap, rear of rotating band		0.40%	3.2	Visual
					Gage
MINOR					
201.	Marking missing or unidentifiable		0.65%	3.2	Visual
202.	Evidence of poor workmanship		0.65%	3.6	Visual

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CLASSIFICATION OF DEFECTS & TESTS

PARAGRAPH	TITLE	SHEET 1 OF 1	DRAWING NUMBER 8886405
4.4.2.9	Linked Ammunition, Prior to Packing		NEXT HIGHER ASSEMBLY
CATEGORY	EXAMINATION OR TEST	AQL OR 100%	REQUIREMENT PARAGRAPH
CRITICAL	NO. OF SAMPLE UNITS		PARAGRAPH REFERENCE / INSPECTION METHOD
1.	Link improper (anyone of the four (4) tabs of link not in groove; link inverted; link damaged; link distorted	100%	3.2
MAJOR	None defined		Visual
MINOR	None defined		
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CLASSIFICATION OF DEFECTS & TESTS

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PARAGRAPH	TITLE	SHEET 1 of 1		DRAWING NUMBER
4.4.2.10	Unsealed Fiber Box or Unsealed Shipping and Storage Container			9251996 or 9362543
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH
CRITICAL	None defined			
MAJOR	Cartridge inverted		0.40%	Visual
101.	Incorrect number of cartridges		0.40%	Visual
102.	Fillers missing		0.40%	Visual
103.	Support missing		0.40%	Visual
104.	Spacer missing (when applicable)		0.40%	Visual
105.	Top pad missing (when applicable)		0.40%	Visual
106.	None defined		0.40%	Visual
MINOR				
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CLASSIFICATION OF DEFECTS & TESTS

PARAGRAPH	TITLE	SHEET 1 OF 1		DRAWING NUMBER	
4.4.2.11	Sealed Fiber Box, Prior to Sealing Bag			9251996	
				NEXT HIGHER ASSEMBLY	
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
<u>CRITICAL</u>	None defined				
MAJOR	Container damaged		0.40%	3.2	Visual
101.	Corners not blunted		0.40%	3.2	Visual
102.	Heat seal test of packing seals	*	*	3.2	4.5.14
103.					
MINOR	Contents loose		0.65%	3.2	Manual
201.	Label missing or unidentifiable		0.65%	3.2	Visual
202.					
<p>Notes: *This test shall be performed after sealing bag. Sampling and rejection shall be in accordance with MIL-P-116.</p>					

AMSMC Form 1570, 1 Feb 85

Replaces DRSMC-QA (D) Form 160, 1 Aug 83, which may not be used.

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PARAGRAPH 4.4.2.12	TITLE Unsealed Wooden Packing Box	SHEET 1 of 1		DRAWING NUMBER 9251995
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH
CRITICAL	None defined			
MAJOR 101.	Marking of bag misleading or unidentifiable		0.40%	3.2
102.	Bag torn or perforated		0.40%	3.2
103.	Bag improperly sealed		0.40%	3.2
MINOR	None defined			
Visual Visual Visual				
PARAGRAPH REFERENCE / INSPECTION METHOD				
NEXT HIGHER ASSEMBLY				
NOTES				

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CLASSIFICATION OF DEFECTS & TESTS

PARAGRAPH	TITLE	SHEET 1 of 1		DRAWING NUMBER
CATEGORY	EXAMINATION OR TEST	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
4.4.2.13	Sealed Wooden Packing Box or Sealed Shipping and Storage Container			9251995 or 9362543 NEXT HIGHER ASSEMBLY
<u>CRITICAL</u>	None defined			
MAJOR 101.	Box or container damaged	0.40%	3.2	Visual
MINOR 201. 202.	Contents loose Car seal missing or improperly positioned	0.65% 0.65%	3.2 3.2	Manual Visual
203.	Marking misleading or unidentifiable	0.65%	3.2	Visual
<p>NOTES:</p>				

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4.4.3 Testing.

4.4.3.1 Functioning. Beginning with the first lot produced and continuing until three (3) consecutive lots have been accepted, the Government inspector shall select five hundred and seventy-six (576) cartridges from each lot for this test. Two hundred and eighty-eight (288) samples each will be fired from the M129 Grenade Launcher and the MK19, MOD III Grenade Launcher as follows:

a. One hundred and forty-four (144) cartridges shall be fired to impact at approximately 200 meters from the launcher on coarse sand, ten inches minimum thickness at point of impact (M129).

b. One hundred and forty-four (144) cartridges shall be fired to impact at approximately 200 feet from the launcher against a vertical 2 1/2 inch mild steel plate (M129).

c. Two hundred and eighty-eight (288) cartridges shall be fired to impact at approximately 200 meters from the launcher on coarse sand, ten inches minimum thickness at point of impact (MK19, MOD III).

The sample cartridges shall be selected at random prior to linking and then linked with the same lot of links to which its respective end item lot has been assembled.

4.4.3.1.1 Rejection. The lot shall be rejected if:

a. Combined phases, twelve (12) or more fail high order detonation at initial impact (MK19, MOD III).

b. Any primer blows back (as evidenced by perforation of the primer cup or smoke deposit on base plug or cartridge case base) (MK19, MOD III).

c. Any premature burst occurs (See 6.8) (MK19, MOD III).

d. Two (2) or more primers misfire (MK19, MOD III).

e. Any projectile sticks in gun bore (MK19, MOD III).

f. Mean velocity or standard deviation fail to meet the applicable requirement (MK19, MOD III).

g. Three (3) or more base plugs are more than .005 above flush with rear of cartridge case (See 4.5.17) or one (1) or more base plugs exceed .010 with rear of cartridge case or jams the automatic weapon (M129).

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h. The action time of three (3) or more rounds are over four (4) milliseconds or if one (1) round is over ten (10) milliseconds (M129).

i. Nine (9) or more fail full penetration (M129).

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.

4.4.3.1.2 Suitability test plan (informational test only).
Beginning with the first lot produced by each producer and continuing until that producer has submitted three (3) consecutive lots that are accepted in accordance with 4.4.3.1, an extra sample of one hundred and fifty (150) or one hundred and forty-four (144) rounds as applicable shall be selected from each lot and pre-conditioned and tested as follows:

a. The one hundred and fifty (150) or one hundred and forty four (144) rounds as applicable shall be packaged in their regular shipping containers and subjected to transportation vibration environment in accordance with MIL-STD-331, Test No. 119.

b. After transportation vibration, the rounds shall be unpacked and subjected to JAN temperature and humidity cycle (14 days) specified in MIL-STD-331, Test No. 105.

c. After temperature and humidity cycle, the rounds shall be temperature conditioned and fired as follows:

50 or 44 rounds (as applicable)
50 or 44 rounds ambient (between +40 and +110
degrees F.)
50 or 44 rounds -65 degree F. \pm 5 degrees F.

d. Fire the rounds in accordance with 4.5.16 (Armor Plate). Test results, failure analysis reports and other information as requested shall be forwarded to ARDC, ATTN: AMSMC-QAF-S(D) for evaluation.

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4.4.3.2 Functioning, regular production. After three (3) consecutive lots have met the criteria of 4.4.3.1, the Government inspector shall select two hundred and eighty-eight (288) cartridges from each lot for this test. One hundred and forty-four (144) samples each will be fired from the M129 Grenade Launcher and the MK19, MOD III Grenade Launcher as follows:

a. Seventy-two (72) cartridges shall be fired to impact at approximately 200 meters from the launchers on coarse sand, ten inches minimum thickness at point of impact (M129).

b. Seventy-two (72) cartridges shall be fired to impact at approximately 200 feet from the launcher against a vertical 2 1/2 inch mild steel plate (M129).

c. One hundred and forty-four (144) cartridges shall be fired to impact at approximately 200 meters from the launcher on coarse sand, ten inches minimum thickness at point of impact (MK19, MOD III).

The sample cartridges shall be selected at random prior to linking and then linked with the same lot of links to which its respective end item lot has been assembled.

4.4.3.2.1 Rejection. The lot shall be rejected if:

a. Combined phases, seven (7) or more fail high order detonation at initial impact (MK19, MOD III).

b. Any primer blows back (as evidenced by perforation of the primer cup or smoke deposit on base plug or cartridge case base) (MK19, MOD III).

c. Any premature burst occurs (See 6.8) (MK19, MOD III).

d. Two (2) or more primers misfire (MK19, MOD III).

e. Any projectile sticks in gun bore (MK19, MOD III).

f. Mean velocity or standard deviation fail to meet the applicable requirement (MK19, MOD III).

g. Three (3) or more base plugs are more than .005 above flush with rear of cartridge case (See 4.5.17) or one (1) or more base plugs exceed .010 with rear of cartridge case or jams the automatic weapon (M129).

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h. The action time of one (1) or two (2) rounds is over four (4) milliseconds with no round exceeding ten (10) milliseconds, an additional 200 rounds shall be tested. The results for the 344 rounds shall be combined. If three (3) or more rounds are four (4) milliseconds or if one (1) round is over ten (10) milliseconds, the lot shall be rejected (M129).

i. Five (5) or more fail full penetration (M129).

4.4.3.2.1.1 If thirteen (13) thru nineteen (19) assemblies fail high order detonation at initial impact, a second sample of three hundred and forty-four (344) cartridges shall be forwarded and tested. If the combined number of rejects in the first and second sample is twenty-seven (27) or more, the lot shall be rejected (MK19, MOD III).

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.

4.4.3.3 Rapid fire functioning. Three (3) full metal cans (48 linked cartridges per 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 examinations and tests prescribed herein is described in the Paragraph Reference/Inspection Method Column in the tables starting with paragraph 4.4.2.1. The contractor shall submit for approval, inspection equipment designs in accordance with terms of the contract. See Section 6 of MIL-A-48078 and 6.3 herein.

4.5 Test methods and procedures.

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

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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. At the start of production, 380 consecutive samples per station per machine shall be selected and weighed 100 percent. All samples shall comply with the applicable drawing requirement. If all samples comply with the applicable drawing requirement, five (5) samples per station every 2 hours production shall be selected and the average weight of the five (5) samples must meet the assessed mean propellant weight within ± 30 mgs. If the average weight fails the applicable drawing requirement, correction will be made and 380 consecutive samples weighed from that station. If all samples meet the applicable requirement, the sampling every 2 hours will 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 prior to assembling to body assemblies. Improperly assembled, missing parts, armed or partially armed fuze assemblies shall be determined by x-ray equipment or any other method satisfactory to the Contracting 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.

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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.

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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.

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 any major defect is found, it shall be noted and replaced with a good sample and 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. The rounds being tested shall be temperature conditioned at $70^{\circ}\text{F} \pm 5^{\circ}\text{F}$ for at least eight (8) 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 four 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 fails 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

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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).

Armor Plate. The cartridge shall be fired against and fully penetrate a vertical 2 1/2 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. The three (3) full metal cans (144 linked cartridges) 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. 9251996 or 9362543 as applicable.

5.2 Packing.

5.2.1 Level A. The cartridge shall be packed in accordance with Dwg. 9251995 or 9362543 as applicable.

5.3 Marking. Marking shall be in accordance with Dwg. 8796522 and Code of Federal Regulations, Title 49, Parts 100-199.

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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. Palletize shall be as described on Dwg. 9362543.

6. NOTES

6.1 Intended use. Not applicable.

6.2 Ordering data. See MIL-A-48078.

6.3 Submission of inspection equipment designs for approval. See MIL-A-48078 (AR). Submit equipment designs as required to Commander, ARDC, ATTN: AMSMC-QAF-I(D), Dover, NJ 07801-5001. Request letter of submittal state contractor, contract number, specification number, item nomenclature and classification of defects or test paragraph.

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, ARDC, ATTN: AMSMC-QAF-S(D), Dover, NJ 07801-5001.

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, ARDC, ATTN: AMSMC-QAF-S, Dover, NJ 07801-5001.

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 shall be calculated from the following formula.

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

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where: X = each individual value

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

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

$$s = \sqrt{\frac{n \sum x^2}{n} - \frac{(\sum x)^2}{(n-1)}}$$

Other approved standard deviation formulas may be used.

6.8 Premature burst. A premature burst is considered to have occurred if the round functions in gun bore or in flight.

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 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 visual 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 US Army Armament Research and Development Center (ARDC) may also include drawings prepared by, and identified as, Edgewood Arsenal, Frankford Arsenal, Rock Island Arsenal, or ARADCOM drawings. Technical data originally prepared by these activities is now under the cognizance of ARDC.

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6.12 Proving ground test summary:

<u>TEST</u>	<u>SAMPLE SIZE</u>	<u>REQUIREMENTS</u>
<u>Functioning</u>		
(1) First 3 lots	576 Total 288 (M129 GL) 144 Sand 144 Plate 288 Sand (MK19, MOD III GL)	See 3.5 and 4.4.3.1.1
(2) Regular Production	288 Total 149 (M129 GL) 72 Sand 72 Plate 144 Sand (MK19, MOD III, GL)	See 3.5 and 4.4.3.2.1
(3) Rapid Fire Functioning	3 Full Metal Cans	4.4.3.3

6.13 Changes from previous issue. Asterisks 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-A359)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL*(See Instructions - Reverse Side)***1. DOCUMENT NUMBER**

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2. DOCUMENT TITLE

CARTRIDGE, 40MM, HEDP, M430 LOADING, ASSEMBLING AND PACKING

3a. NAME OF SUBMITTING ORGANIZATION**4. TYPE OF ORGANIZATION (Mark one)**☐

VENDOR

☐

USER

☐

MANUFACTURER

☐

OTHER (Specify): _____

b. ADDRESS (Street, City, State, ZIP Code)**5. PROBLEM AREAS****a. Paragraph Number and Wording:****b. Recommended Wording:****c. Reason/Rationale for Recommendation:****6. REMARKS****7a. NAME OF SUBMITTER (Last, First, MI) - Optional****b. WORK TELEPHONE NUMBER (Include Area Code) - Optional****c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional****8. DATE OF SUBMISSION (YYMMDD)**