

MIL-C-63092 (PA)
28 July 1976

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MILITARY SPECIFICATION
CARTRIDGE, 40MM, RED STAR, PARACHUTE, M662
METAL PARTS
AND
LOADING, ASSEMBLING AND PACKING

This specification is approved for use by Picatinny Arsenal, Department of the Army and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 This specification covers the metal parts and loading, assembling and packing for one type of cartridge designated as Cartridge, 40MM, Red Star, Parachute, M662.

2. APPLICABLE DOCUMENTS

2.1 Issues of Documents - The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

SPECIFICATIONS

MILITARY

MIL-P-223	- Black Powder
MIL-C-5541	- Chemical Films and Chemical Film Materials for Aluminum and Aluminum Alloys
MIL-P-22264	- Powders, Ignition, Gasless

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Picatinny Arsenal, Dover, NJ 07801 by using the self addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC: 1310

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- MIL-A-48078 - Ammunition, Standard Quality Assurance Provisions, General Specification For

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-1169 - Packaging, Packing and Marking for Shipment of Inert Ammunition Components
- MIL-STD-1234 - Pyrotechnics Sampling, Inspection and Testing

DRAWINGS

PICATINNY ARSENAL

PRODUCT AND PACKING DRAWINGS

- 9255145 - Cartridge, 40MM, Red Star, Parachute, M662
- 9209204 - Box, Ammo, Metal for Cartridge, 40MM, White Star, Cluster or Smoke Canopy or Parachute
- 9209205 - Box, Wirebound, Packing, Ammunition for Cartridge, 40MM, White Star, Cluster or Smoke Canopy or Parachute

INSPECTION EQUIPMENT DRAWINGS

- 9202770 -- Chamber Gage
- 9202783 - Alignment Check

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8827895	- Limit Check
9201136	- Tunnel for Light Intensity Measurement
9201268	- Procedure for Light Output Measurement
9201390	- Photocell Checkout Procedure
9200964	- Photometer Head with Cell
9200965	- Tube, Sight
9200966	- Cover
9200967	- Bracket, Tube
9200968	- Gasket, Rear
9200969	- Gasket
9200970	- Cabinet
9200971	- Hood
9200972	- Brakcet
9200973	- Holder
9200974	- Spring
9201392	- Color Value
9247071	- Photocell

2.2 Other Publications - The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on the date of invitation for bids or request for proposal shall apply.

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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)").

AMERICAN SOCIETY FOR TESTING AND MATERIALS

ASTM B 117-73 - Standard Method of Salt Spray
(Fog) Testing

(Application for copies should be addressed to: American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103)

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.) 9255145, all associated drawings, and with all requirements specified in applicable specifications.

3.3 Transportation Vibration - The cartridge shall comply with the following requirements:

3.3.1 The cartridge shall be safe to transport following this test (See 6.6).

3.3.2 There shall be no evidence of external damage to the cartridge that will affect the intended function (See 6.7).

3.4 Functioning - The cartridge shall comply with the following requirements;

3.4.1 Altitude - The projectile shall function at an average altitude of 600 \pm 100 feet.

3.4.2 Burning of Illuminate Assembly - The illuminant assembly shall burn in the air for 30 seconds min. while suspended from the parachute.

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3.4.3 Parachute - The parachute shall not separate from the illuminant assembly at ejection or delay opening from time of ejection for more than 5 seconds.

3.4.4 Firing - No projectile shall stick in the gun bore.

3.4.5 Hot Temperature (160 degrees F. plus or minus 5 degrees F.) - The cartridge shall comply with the requirements of 3.4.1, 3.4.2, 3.4.3 and 3.4.4.

3.4.6 Ambient Temperature (70 degrees F. plus or minus 5 degrees F.) - The cartridge shall comply with the requirements of 3.4.1, 3.4.2, 3.4.3 and 3.4.4.

3.4.7 Cold Temperature (-65 degrees F. plus or minus 5 degrees F.) - The cartridge shall comply with the requirements of 3.4.1, 3.4.2, 3.4.3 and 3.4.4.

3.5 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.

3.6 First Article Inspection - This specification contains technical provisions for first article inspection. Requirements for the submission of first article samples by the contractor shall be as specified in the contract.

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 following types of inspection shall be conducted on this item:

- a. First Article Inspection
- b. Quality Conformance Inspection

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4.3 First Article Inspection -

4.3.1 Submission - The contractor shall submit a first article as designated by the Contracting Officer for evaluation in accordance with the provisions of 4.3.2. The first article sample shall consist of the following items in sample quantities as indicated.

<u>Part Description</u>	<u>Drawing</u>	<u>Quantity</u>
Body	9243900	25 (5 painted)
Ogive	9251920	25
Tube	9244311	25
Delay Carrier	9243886	25 (5 for Salt Spray)
Plug Anchors	9243907	25
Illuminant Loading Assembly	9252412	25
Cartridge	9255145	465 (440 to a Government Proving Ground for Ballistic Testing)
Delay Loading Assembly	9243885	25
Parachute Assembly	9243906	25

4.3.2 Inspections to be Performed - See MIL-A-48078 and Table I herein.

4.3.3 Rejection - See MIL-A-48078 and the following:

4.3.3.1 Proving Ground Tests -

- a. Any critical defect occurs in any phase (see Table III).
 - b. Average altitude of the total sample fails the applicable requirement (see Table III and 3.4.1).
 - c. A total of eight (8) or more in the hot phase fail any of the following:
 - (1) Parachute failure (See 3.4.3).
 - (2) Item fails to function (See Table III).
 - (3) No illumination (See Table III).
- Burning time should be recorded for informational purposes (average).

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d. A total of twenty-two (22) or more in the ambient phase fail any of the following:

- (1) Burning time incorrect (See 3.4.2) (Average).
- (2) Parachute failure (See 3.4.3).
- (3) Item fails to function (See Table III).

e. A total of eight (8) or more in the cold phase fail any of the following:

- (1) Parachute failure (See 3.4.3).
- (2) Item fails to function (See Table III).
- (3) No illumination (See Table III).

Burning time should be recorded for informational purposes (Average).

f. Two (2) or more of the total sample are below an altitude of 350 ft (See Table III).

TABLE 1 -- FIRST ARTICLE INSPECTION
CLASSIFICATION OF DEFECTS & TESTS

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PARAGRAPH	TITLE	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	SHEET 1 OF 2	DRAWING NUMBER	
						See Below	NEXT HIGHER ASSEMBLY
CATEGORY					REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD	
	Cartridge and Components						
	Body (Dwg. 9243900) <u>Prior to painting</u> Examination for defects Salt Spray		20 5		3.2 3.2	4.4.2.1 4.5.3	
	<u>After painting</u> Examination for defects		5		3.2	4.4.2.2	
	Ogive (Dwg. 9251920) Examination for defects		25		3.2	4.4.2.3	
	Tube (Dwg. 9244311) Examination for defects		25		3.2	4.4.2.4	
	Delay Carrier (Dwg. 9243886) <u>Examination for defects</u> Salt Spray		20 5		3.2	4.4.2.5 4.5.3	
	Plug Anchor (Dwg. 9243907) <u>Examination for defects</u>		25		3.2	4.4.2.6	
	Illuminant Assembly (Dwg. 9252412) Examination for defects Candle Power		25 25		3.2 3.2	4.4.2.7 4.5.4	
NOTES:							

TABLE 1 - FIRST ARTICLE INSPECTION
CLASSIFICATION OF DEFECTS & TESTS

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PARAGRAPH	TITLE	SHEET 2 OF 2		DRAWING NUMBER
		AQL OR 100%	REQUIREMENT PARAGRAPH	See Below NEXT HIGHER ASSEMBLY
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	PARAGRAPH REFERENCE / INSPECTION METHOD	
	Cartridge and Components			
	Parachute Assembly (Dwg. 9243906) Examination for defects	25	3.2	4.4.2.8
	Delay Loading Assembly (Dwg. 9243885) Burn time	25	3.2	4.5.5
	Cartridge (Dwg. 9255145) Examination for defects	25	3.2	4.4.2.12
	Pull test of projectile	25	3.2	4.5.6
	*Transportation-vibration	440	3.2	4.5.7
	*Air pressure	440	3.2	4.5.8
	Functioning			
	Hot	80	3.2	4.5.9.1
	Ambient	280	3.2	4.5.9.2
	Cold	80	3.2	4.5.9.3
NOTES: *Prior to submission of the 440 samples to a Gov't proving ground for functioning tests, the samples shall be inspected at the contractors plant for these tests.				

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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. Projectile metal parts from one interfix lot number from one manufacturer.
- b. Delay composition from not more than one lot number.
- c. Igniter composition from not more than one lot number.
- d. Black powder from not more than one lot number.
- e. Illuminant composition produced by one manufacturer under one continuous set of operating conditions and which consist of one or more batches that have been subjected to the same unit chemical or physical mixing process intended to make the final product homogeneous.
- f. Cartridge case loaded assemblies from one interfix lot number from one manufacturer.
- g. Illuminant assemblies from one interfix lot number from one manufacturer.
- h. Ignition composition from not more than one lot number.
- i. Delay Assemblies 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
CLASSIFICATION OF DEFECTS & TESTS

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PARAGRAPH	TITLE	SHEET 1 OF 2		DRAWING NUMBER
4.4.2.1	Body, prior to Painting			9243900 -1
CATEGORY	EXAMINATION OR TEST	AQL OR 100%	REQUIREMENT PARAGRAPH	NEXT HIGHER ASSEMBLY
				9252411
				PARAGRAPH REFERENCE / INSPECTION METHOD
<u>Critical</u>	None defined			
Major				
101	Largest outside diameter	0.40%	3.2	Gage
102	Concentricity of largest outside diameter with second largest outside diameter	0.40%	3.2	Gage
103	Second largest outside diameter	0.40%	3.2	Gage
104	Concentricity of second largest outside diameter with smallest inside diameter	0.40%	3.2	Gage
105	Concentricity of largest inside diameter with smallest inside diameter	0.40%	3.2	Gage
106	Salt Spray	*	3.2	Gage
107	Pitch diameter of thread	0.40%	3.2	4.5.3
108	Minor diameter of thread, max.	0.40%	3.2	Gage
109	Perpendicularity of open end with smallest inside diameter	0.40%	3.2	Gage
110	Metal defective	0.40%	3.2	Gage
		0.40%	3.5 & 6.9	Visual
Minor				
201	Smallest outside diameter	0.65%	3.2	Gage
202	Groove diameter	0.65%	3.2	Gage
203	Width of rotating bands	0.65%	3.2	Gage
204	Total length	0.65%	3.2	Gage
205	Width of flange	0.65%	3.2	Gage
206	Distance to rotating band	0.65%	3.2	Gage
NOTES: * Sampling and rejection shall be in accordance with MIL-C-5541.				

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PARAGRAPH	TITLE	SHEET 2 OF 2		DRAWING NUMBER
CATEGORY	EXAMINATION OR TEST	AQL CR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
4.4.2.1	Body, prior to Painting			9243900 NEXT HIGHER ASSEMBLY
207	Evidence of poor workmanship	0.65%	3.5	Visual
NOTES:				

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PARAGRAPH	TITLE	SHEET 1 OF 1		DRAWING NUMBER
CATEGORY	EXAMINATION OR TEST	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
4.4.2.2	Body after Painting			9243900 NEXT HIGHER ASSEMBLY 9252411
<u>Critical</u>	None defined			
<u>Major</u> 101	Second largest outside diameter	0.40%	3.2	Gage
<u>Minor</u> 201	Color incorrect	0.65%	3.2	Visual
NOTES:				

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PARAGRAPH	TITLE	SHEET 1 OF 1		DRAWING NUMBER
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	9251920
				NEXT HIGHER ASSEMBLY
				9252411
				PARAGRAPH REFERENCE / INSPECTION METHOD
4.4.2.3	Ogive			
<u>Critical</u>				
1	Incorrect letter	(See 4.5.1)	100%	3.2 Visual
<u>Major</u>				
101	Large outside diameter		0.40%	3.2 Gage
102	Concentricity of large outside diameter with third largest outside diameter		0.40%	3.2 Gage
103	Second largest outside diameter		0.40%	3.2 Gage
104	Inside diameter		0.40%	3.2 Gage
<u>Minor</u>				
201	Total length		0.65%	3.2 Gage
202	Width of slots		0.65%	3.2 Gage
203	Diameter of groove		0.65%	3.2 Gage
204	Width of groove		0.65%	3.2 Gage
205	Evidence of poor workmanship		0.65%	3.5 Visual
NOTES:				

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PARAGRAPH	TITLE	SHEET 1 OF 1		DRAWING NUMBER
				9244311
				NEXT HIGHER ASSEMBLY
				9252412
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH
				PARAGRAPH REFERENCE / INSPECTION METHOD
4.4.2.4	Tube			
<u>Critical</u>	None defined			
<u>Major</u>	Outside diameter		0.40%	3.2
101	Wall thickness		0.40%	3.2
102	Perpendicularity of ends		0.40%	3.2
103				
<u>Minor</u>	Total length		0.65%	3.2
201	Evidence of poor workmanship		0.65%	3.5
202				
Gage Gage Gage Gage Visual				
NOTES:				

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PARAGRAPH	TITLE	SHEET 1 OF 1		DRAWING NUMBER
CATEGORY	EXAMINATION OR TEST	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
4.4.2.5	Delay Carrier.			9243886 NEXT HIGHER ASSEMBLY 9243885
<u>Critical</u>	None defined			
<u>Major</u>				
101	Salt Spray	*		4.5.3
102	Pitch diameter of thread	0.40%	3.2	Gage
103	Major diameter of thread	0.40%	3.2	Gage
104	Small inside diameter	0.40%	3.2	Gage
105	Concentricity of small inside diameter with large inside diameter	0.40%	3.2	Gage
106	Large inside diameter	0.40%	3.2	Gage
<u>Minor</u>				
201	Length to flange	0.65%	3.2	Gage
202	Concentricity of body diameter with large inside diameter	0.65%	3.2	Gage
203	Diameter of thread undercut	0.65%	3.2	Gage
204	Evidence of poor workmanship	0.65%	3.5	Visual

NOTES: *Sampling and rejection shall be in accordance with MIL-C-5541.

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PARAGRAPH	TITLE	SHEET 1 OF 1	DRAWING NUMBER	NEXT HIGHER ASSEMBLY	PARAGRAPH REFERENCE / INSPECTION METHOD
CATEGORY	EXAMINATION OR TEST	AQL OR 100%	REQUIREMENT PARAGRAPH		
		NO. OF SAMPLE UNITS			
4.4.2.6	Plug Anchor				
<u>Critical</u>	None defined				
Major					
101	Largest outside diameter				
102	Flange thickness	0.40%	3.2		Gage
103	Second largest outside diameter	0.40%	3.2		Gage
		0.40%	3.2		Gage
Minor					
201	Total length	0.65%	3.2		Gage
202	Holes missing	0.65%	3.2		Visual
203	Evidence of poor workmanship	0.65%	3.5		Visual
204	Width of slot incorrect	0.65%	3.2		Gage
205	Depth of slot incorrect	0.65%	3.2		Gage
NOTES:					

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PARAGRAPH	TITLE	SHEET 1 OF 1		DRAWING NUMBER
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AGL OR 100%	REQUIREMENT PARAGRAPH
4.4.2.7	Illuminant Loading Assembly			9252412
				NEXT HIGHER ASSEMBLY
				9252411
				PARAGRAPH REFERENCE / INSPECTION METHOD
<u>Critical</u>	None defined			
Major	Length from shoulder to end			
101	Diameter, max.		0.40%	3.2
102	Anchor plug insecure		0.40%	3.2
103	Assembly damaged to extent that function may be impaired		0.40%	3.2
104	Candle power		0.40%	3.2
105				Visual
Minor	Evidence of poor workmanship		0.65%	4.4.3.2, 4.4.3.3 and 4.5.4
201				Visual
NOTES:				

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PARAGRAPH	TITLE	SHEET 1 OF 1	DRAWING NUMBER
4.4.2.8	Parachute Assembly		9243906
CATEGORY	EXAMINATION OR TEST	AQL OR 100%	NEXT HIGHER ASSEMBLY 9252411
<u>Critical</u>	None defined		PARAGRAPH REFERENCE / INSPECTION METHOD
Major			
101	Tears or holes in parachute	0.40%	Visual
102	Shroud lines not attached to parachute	0.40%	Visual
103	Shroud lines tangled	0.40%	Visual
104	Coupling not secure to shroud lines	0.40%	Visual
		3.2	
		3.2	
		3.2	
		3.2	

NOTES:

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PARAGRAPH	TITLE	SHEET 1 OF 1		DRAWING NUMBER
CATEGORY	EXAMINATION OR TEST	AQL OR 100%	REQUIREMENT PARAGRAPH	NEXT HIGHER ASSEMBLY
4.4.2.9	Delay Assembly			9243885
				9252411
<u>Critical</u>	None defined			PARAGRAPH REFERENCE / INSPECTION METHOD
Major 101	Static burn time	32	3.2	9201136 9200973 9201268 9200974 9201390 9201392 9200964 9247071 9200965 4.5.5 9200966 9200967 9200968 9200969 9200970 9200971 9200972
NOTES:				

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PARAGRAPH	TITLE	SHEET 1 of 1		DRAWING NUMBER
CATEGORY	EXAMINATION OR TEST	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
4.4.2.10	Projectile assembly, prior to assembling illuminant assembly			9252411 NEXT HIGHER ASSEMBLY
				9255145
<u>Critical</u>	None defined			
<u>Major</u> 101	Coupling of illuminant assembly not secure to chain	0.40%	3.2	Visual
NOTES:				

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PARAGRAPH	TITLE	SHEET 1 OF 1		DRAWING NUMBER
CATEGORY	EXAMINATION OR TEST	AOL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
4.4.2.11	Projectile assembly, prior to assembling ogive			9252411 NEXT HIGHER ASSEMBLY
<u>Critical</u>	None defined			9255145
Major	Parachute missing	0.40%	3.2	Visual
101	O-ring missing	0.40%	3.2	Visual
102	Spring pin missing	0.40%	3.2	Visual
103				
NOTES:				

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PARAGRAPH	TITLE	SHEET 1 OF 1		DRAWING NUMBER
CATEGORY	EXAMINATION OR TEST	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
4.4.2.12	Projectile Assembly			9252411 NEXT HIGHER ASSEMBLY 9255145
<u>Critical</u>	None defined			
<u>Major</u> 101	Gap present between delay assembly and body	0.40%	3.2	Visual
102	Color incorrect	0.40%	3.2	Visual
<u>Minor</u> 201	Evidence of poor workmanship	0.65%	3.5	Visual
NOTES:				

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PARAGRAPH	TITLE	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	SHEET 1 OF 1		DRAWING NUMBER
				AQL OR 100%	REQUIREMENT PARAGRAPH	
4.4.2.13	Cartridge					9255145 NEXT HIGHER ASSEMBLY
CATEGORY						PARAGRAPH REFERENCE /INSPECTION METHOD
<u>Critical</u>						
1	Chamber gage failure			100%	3.2	9202770 9202783 3827895
2	Incorrect ogive			100%	3.2	Visual
3	Marking incorrect			100%	3.2	Visual
<u>Major</u>						
101	Marking unidentifiable		50	0.40%	3.2	Visual
102	Pull test			2.50%	3.2	4.5.6
103	Transportation-vibration				3.3	4.4.3.5, 4.4.3.8 and 4.5.7
104	Air pressure				3.2	4.4.3.4, 4.4.3.6, 4.4.3.9 and 4.5.8
105	Functioning				3.4	4.4.3.7, 4.4.3.10 and 4.5.9
<u>Minor</u>						
201	Total length			0.65%	3.2	Gage

NOTES:

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PARAGRAPH	TITLE	SHEET 1 OF 1		DRAWING NUMBER
CATEGORY	EXAMINATION OR TEST	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
4.4.2.14	Unsealed Metal Box			9209204 NEXT HIGHER ASSEMBLY
<u>Critical</u>	None defined			
Major 101	Incorrect number of cartridges	0.40%	3.2	Visual
102	Desiccant bags missing	0.40%	3.2	Visual
103	Rubber gasket damaged or improperly assembled	0.40%	3.2	Visual
Minor 201	Fillers missing	0.65%	3.2	Visual
202	Tube missing	0.65%	3.2	Visual
NOTES:				

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PARAGRAPH	TITLE	SHEET 1 OF 1		DRAWING NUMBER
CATEGORY	EXAMINATION OR TEST	AQL OR 100%	REQUIREMENT PARAGRAPH	9209204 NEXT HIGHER ASSEMBLY
		NO. OF SAMPLE UNITS	PARAGRAPH REFERENCE / INSPECTION METHOD	
4.4.2.15	Sealed Metal Box			
<u>Critical</u>	None defined			
<u>Major</u> 101	Air pressure	*	3.2	4.5.10
<u>Minor</u> 201 202	Marking misleading or unidentifiable Contents loose	0.65% 0.65%	3.2 3.2	Visual Manual
<p>NOTES: *One (1) packed, sealed box shall be selected from each twenty (20) boxes packed. If one (1) box fails, the quantity represented by the sample shall be rejected.</p>				

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CLASSIFICATION OF DEFECTS & TESTS

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PARAGRAPH	TITLE	SHEET 1 OF 1		DRAWING NUMBER
4.4.2.16	Sealed Wooden Packing Box			9209205
CATEGORY	EXAMINATION OR TEST	AQL OR 100%	REQUIREMENT PARAGRAPH	NEXT, HIGHER ASSEMBLY
Critical	None defined			PARAGRAPH, REFERENCE, /INSPECTION, METHOD
Minor	Marking misleading or unidentifiable	0.65%	3.2	Visual
201	Contents loose	0.65%	3.2	Manual
202	ICC nomenclature missing	0.65%	3.2	Visual
203				
NOTES:				

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4.4.3 Testing -4.4.3.1 Moisture Content (See Table 1), Major -

TABLE I

<u>Material</u>	<u>Drawing</u>
Delay Composition	9243885
Igniter Composition	9243885
Ignition Composition	9252412
Black Powder	9252412
Illuminant Composition	9252412

The contractor shall provide adequate controls to insure compliance with the requirements and shall test for verification at least one (1) sample of each material from each eight hour's production of cartridges. Composite samples shall not be used. If the moisture content of a sample exceeds the requirement and loading has not begun, that quantity of material represented by the sample shall be rejected. If assemblies have been loaded with material containing excessive moisture, the remaining material that is represented by the sample together with all cartridges loaded with the non-forming material shall be rejected.

4.4.3.2 Candle Power of Illuminant Assembly - Beginning with the first lot produced and continuing until three (3) acceptable lots (lots not accepted by disposition) have been accepted, eighty (80) assemblies shall be selected from each lot for this test. If three (3) or more assemblies fail to comply with the requirement specified on the applicable drawing, the lot shall be rejected.

4.4.3.3 Candle Power of Illuminant Assembly, Regular Production - After three (3) acceptable lots have met the criteria of 4.4.3.2, the Government Inspector shall select thirty-two (32) assemblies from each lot for this test. If two (2) or more assemblies fail to comply with the requirement specified on the applicable drawing, the lot shall be rejected.

At the start of production, or when there has been a lapse of 90 days, or when a major design change occurs as determined by the Government inspector, the criteria of 4.4.3.2 shall apply.

4.4.3.4 Air Pressure - This test shall be conducted 100 percent. Any cartridge which fails to comply with the requirement specified on the applicable drawing shall be classified defective and removed from the lot.

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4.4.3.5 Transportation-Vibration - After completion of the 100 percent air pressure test and beginning with the first lot produced and continuing until three (3) acceptable lots (lots not accepted by disposition) have complied with the acceptance criteria specified in TABLE II, two-hundred and sixty-four (264) cartridges shall be selected from each lot, packed in their regular shipping containers and subjected to this test. The cartridges shall be observed and examined visually without disassembly for any evidence of failure to comply with the requirements of TABLE II.

TABLE II

<u>Defect</u>	<u>Drawing</u>
Cartridge not safe to transport following test	Critical
Cartridge damaged after test	Major

The lot shall be rejected if any defect as classified in TABLE II occurs.

4.4.3.6 Air Pressure - After completion of the transportation-vibration test, the two-hundred and sixty-four (264) samples from each lot shall be subjected to this test. If nine (9) or more cartridges fail to comply with the requirement specified on the applicable drawing, the lot shall be rejected. Cartridges which fail this test shall be discarded and replaced with units which have been successfully subjected to transportation-vibration test prior to subsequent testing.

4.4.3.7 Functioning - After completion of the air pressure test and beginning with the first lot produced and continuing until three (3) acceptable lots (lots not accepted by disposition) have complied with the criteria of TABLE III, the two-hundred and sixty-four (264) samples from each lot shall be packed and shipped to a Government proving ground and tested as follows:

4.4.3.7.1 Hot - Forty-four (44) samples shall be subjected to this test.

4.4.3.7.2 Ambient - One-hundred and seventy-six (176) samples shall be subjected to this test.

4.4.3.7.3 Cold - Forty-four (44) samples shall be subjected to this test.

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4.4.3.7.4 Rejection - The lot shall be rejected if:

- a. Any critical defects occur in any phase (see Table III).
- b. Average altitude of the total sample fails the applicable requirement (see Table III).
- c. A total of six (6) or more in the hot phase fail any of the following:
 - (1) Parachute failure (see 3.4.3)
 - (2) Item fails to function (see Table III).
 Burning time should be recorded for informational purposes. (Average).
- d. A total of fifteen (15) or more in the ambient phase fail any of the following:
 - (1) Burning time incorrect (see 3.4.2). (Average)
 - (2) Parachute failure (see 3.4.3).
 - (3) Item fails to function (see Table III).
- e. A total of six (6) or more in the cold phase fail any of the following:
 - (1) Parachute failure (see 3.4.3).
 - (2) Item fails to function (see Table III).
 Burning time should be recorded for informational purposes. (Average).
- f. Two (2) or more of the total samples have an altitude less than 350 ft (see Table III).

TABLE III

<u>Defect</u>	<u>Classification</u>
Incorrect color	Critical
Burst or ejects	Critical
Illuminant within 50 feet of the launcher	
Any projectile assembly sticks in the gun bore	Critical
Burning time incorrect (see 3.4.2)	Major
The first emission of light shall be at an average altitude of 600 ± 100 ft	Major
Parachute failure (see 3.4.3).	Major
Altitude less than 350 ft	Major
Item fails to function	Major

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4.4.3.8 Transportation-Vibration, Regular Production - After three (3) acceptable lots have complied with 4.4.3.5 and 4.4.3.7, one-hundred and thirty-two (132) of the samples subjected to the 100% air pressure test shall be selected from each lot, packed in their regular shipping containers and subjected to this test. The lot shall be rejected if any defect as classified in TABLE II occurs.

4.4.3.9 Air Pressure, Regular Production - After completion of the transportation-vibration test, the one-hundred and thirty-two (132) samples shall be removed from their shipping containers and subjected to this test. If eight (8) or more samples fail to comply with the requirement specified on the applicable drawing, the lot shall be rejected. Cartridges which fail this test shall be discarded and replaced with units which have been successfully subjected to transportation-vibration test prior to subsequent testing.

4.4.3.10 Functioning, Regular Production - After three (3) acceptable lots have complied with 4.4.3.7, the one-hundred and thirty-two (132) samples subjected to the air pressure test shall be packed and shipped to a Government proving ground and tested as follows:

4.4.3.10.1 Hot - Twenty-six (26) samples shall be subjected to this test.

4.4.3.10.2 Ambient - Eighty (80) samples shall be subjected to this test.

4.4.3.10.3 Cold - Twenty-six (26) samples shall be subjected to this test.

4.4.3.10.4 Rejection - The lot shall be rejected if:

- a. Any critical defect occurs in any phase (see Table III).
- b. Average altitude of the total sample fails the applicable requirement (see Table III).
- c. A total of four (4) or more in the hot phase fail any of the following:
 - (1) Parachute failure (see 3.4.3).
 - (2) Item fails to function (see Table III).
 Burning time should be recorded for informational purposes. (Average).
- d. A total of eight (8) or more in the ambient phase fail any of the following:

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- (1) Burning time incorrect (see 3.4.2). (Average)
- (2) Parachute failure (see 3.4.3).
- (3) Item fails to function (see Table III).

e. A total of four (4) or more in the cold phase fail any of the following:

- (1) Parachute failure (see 3.4.3).
- (2) Item fails to function (see Table III).

Burning time should be recorded for informational purposes. (Average).

f. Two (2) or more of the total samples have an altitude less than 350 ft (see Table III).

If any lot fails, the consecutive lots thereafter shall revert to the criteria of 4.4.3.5.

4.4.3.11 Suitability Test Plan (Information Test Only) - Beginning with the first lot produced by each producer and continuing until that producer has submitted three (3) acceptable lots (lots not accepted by disposition) that are accepted in accordance with 4.4.3.7.1, 4.4.3.7.2 and 4.4.3.7.3, and extra sample of eighty-eight (88) rounds shall be selected from each lot and preconditioned and tested as follows:

a. The eighty-eight (88) rounds shall be packaged in their regular shipping containers and subjected to transportation vibration environmental in accordance with MIL-STD-331, Test No. 104.

b. After transportation vibration, the rounds shall be unpacked and subjected to the 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:

- 30 rounds + 165 degrees F. \pm 5 degrees F.
- 28 rounds ambient (between + 40 and + 110 degrees F.)
- 30 rounds - 65 degrees F. \pm 5 degrees F.

d. Fire the rounds in accordance with paragraph 4.5.9 and with TECOM Material Test Procedure, TECP 700-700 Volume 4. Test results, failure analysis reports and other information as requested shall be forwarded to Picatinny Arsenal, ATTN: SARPA-QA-A-S.

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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 the terms of the contract. See Section 6 of MIL-A-48078 and 6.3 herein.

4.5 Test Methods and Procedures -

4.5.1 Dimensional Control of Molded or Plastic Parts - In place of the normal sampling and inspections associated with the Classification of Defects, and after a curing time (3) parts (as molded) from each cavity shall be fully inspection dimensionally to qualify a new or reworked cavity for use in production. The molded parts shall carry the individual cavity identification. As a control of each cavity during production, the above quantity of parts from each cavity shall be inspected for at least the defects listed in paragraphs 4.4.2.1 and 4.4.2.5 after continuous production of each 5,000 parts or at the end of each week, whichever occurs first. Of the three (3) samples, one (1) sample shall be the last part produced. If any defective parts are found during qualification of the cavity, the cavity producing the defective part will not be used in production. If any defective parts are found when inspection is performed for the control of the cavity, the cavity producing the defective part shall be removed from production. Further, that portion of production since the last control check shall be returned to the contractor for inspection for each separate type of defect according to MIL-STD-105, using an AQL of 0.40 percent for each major defect and an AQL of 0.65 percent for each minor defect. All cavities removed from production because of some fault may, after reworking, be returned to production providing they pass the qualification test above. The contractor may request a change of inspection frequency providing he presents objective evidence to the Contracting Officer to substantiate the request. Contractor designs of gages and test equipment required to perform the inspections listed herein shall be forwarded to Commander, Picatinny Arsenal, Dover, New Jersey 07801, Attn: SARPA-QA-T, for approval prior to manufacture of equipment. The noted sub-paragraphs identify those items and minimum inspections subject to the requirements of this paragraph.

NOTE 1: In establishing a cure time, dimensionally check ten (10) parts from each cavity at periodic intervals (e.g. every 30, 60, etc. mins) until dimensional stability is attained. The curing time will be from the time the part comes out of the mold until ..

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dimensional stability is attained. The inspection data in determining the curing time shall be sent to Picatinny Arsenal, Dover New Jersey 07801, Attn: SARPA-QA-A-S. If there is a change in material, or in the cycle time, or if a cavity is reworked, or a new cavity is used, a new curing time shall be established and approved.

4.5.2 Moisture Content -

4.5.2.1 Delay Composition - The moisture content of the delay composition at the time and place of loading shall be determined in accordance with Method 102.1 of MIL-STD-1234.

4.5.2.2 Black Powder - The moisture content of the black powder at the time and place of loading shall be determined in accordance with 4.4.3 of MIL-P-223.

4.5.2.3 Ignition Composition - The moisture content of the ignition composition at the time and place of loading shall be determined in accordance with Method 101.4 of MIL-STD-1234 using methyl alcohol as an extraction solvent.

4.5.2.4 Illuminant Composition - The Karl Fischer method as stated in Standard MIL-STD-1234, Method 101.2 up to paragraph 5.3 shall be used. A fifty-gram sample plus or minus 0.1 gram shall be added to a 500 milliliter (ml) volumetric flash containing approximately 300 to 400 ml. methanol and 25 grams of dry sodium nitrate. The flask shall be stoppered and the contents swirled cautiously for several minutes until the material is thoroughly dispersed. The sample shall be allowed to remain in contact with the methanol for approximately two hours. Then the 500 ml. volumetric flash shall be filled up to the 500 ml. mark with methanol and swirled again. A blank without the sample shall be put through the same procedure. After the sample has settled, a 50 ml. aliquot of the clear supernatant liquid shall be withdrawn and immediately transferred to the standard titration vessel containing approximately 100 ml. of methanol which has just been titrated to the preliminary end point as described in Standard MIL-STD-1234, Method 101.2, paragraph 5.1. The final end point shall be reached in 3.5 minutes in the manner described in Standard MIL-STD-1234, Method 101.2, paragraph 5.4. A 50 ml. aliquot of the blank shall be titrated in the same manner. The water content shall be calculated as follows:

$$\% \text{ Water} = \frac{100F [(VR-S) - (V'R-S)]}{W}$$

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Where:

F = grams of water per ml. of standard water in methanol solution

V = ml of Karl Fischer reagent added to the sample

V' = ml of Karl Fischer reagent added to the blank

R = ml of standard water in methanol solution per ml. of Karl Fischer reagent

S = ml of standard water in methanol solution for titration of sample

S' = ml of standard water in methanol solution with back titration of blank

W = weight of sample in grams

4.5.2.5 Igniter Composition - The moisture content of the igniter composition at the time and place of loading shall be determined in accordance with 4.6.4 of MIL-P-22264.

4.5.3 Salt Spray - This test shall be conducted in accordance with ASTM B 117-73.

4.5.4 Candle Power of Illuminant Assembly - This test shall be conducted in accordance with equipment drawings 9201136, 9201268, 9201390, 9200965, 9200966, 9200967, 9200968, 9200969, 9200970, 9200971, 9200972, 9200973, 9200974, 9201392, and 9247071.

4.5.5 Static Burn Time of Delay Assembly - This test shall be conducted in accordance with the equipment specified in 4.4.2.9.

4.5.6 Pull Test of Cartridge - The cartridge shall be placed in an approved fixture and the axial force specified on the applicable drawing shall be applied. Cartridge shall be pulled until total separation occurs and data shall be recorded. This test is a destructive test. Parts so tested shall not be returned to the lot.

4.5.7 Transportation Vibration - The cartridges shall be packaged and packed in accordance with dwgs. 9209204 and 9209205 and tested in accordance with Test No. 104 of MIL-STD-331, except that each box shall be vibrated at the specified amplitudes for four (4) hours in each of three (3) different positions (i.e., box positioned so that the cartridges are vertical with case end down, box positioned so that the cartridges are horizontal, and box positioned so that the cartridges are vertical with case end up. After the test, the box packing and the cartridges shall be examined to determine compliance with the requirements. Cartridges shall be used for subsequent tests.

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4.5.8 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. Cartridges shall be used for subsequent testing.

4.5.9 Functioning - The following tests shall be performed at a Government-owned proving ground:

4.5.9.1 Hot Temperature (160 degrees F. plus or minus 5 degrees F.) - The cartridges shall be packed in their regular shipping containers and conditioned for a minimum of 16 hours at a temperature of 160 degrees F. plus or minus 5 degrees F. The cartridge shall be taken from the conditioning chamber, removed from the packing container, and fired from an approved launcher placed on an approved mount at 90 degrees quadrant within approximately 2 minutes. Observation shall be made for proper functioning and the requirements of 3.4.5.

4.5.9.2 Ambient Temperature (70 degrees F. plus or minus 5 degrees F.) - The cartridges shall be packed in their regular shipping containers and conditioned for a minimum of 16 hours at a temperature of 70 degrees F. plus or minus 5 degrees F. The cartridge shall be taken from the conditioning chamber, removed from the packing container, and fired from an approved launcher placed on an approved mount at 90 degrees quadrant within approximately 2 minutes. Observation shall be made for proper functioning and the requirements of 3.4.6.

4.5.9.3 Cold Temperature (-65 degrees F. plus or minus 5 degrees F.) - The cartridges shall be packed in their regular shipping containers and conditioned for a minimum of 16 hours at a temperature of -65 degrees F. plus or minus 5 degrees F. The cartridge shall be taken from the conditioning chamber, removed from the packing container, and fired from an approved launcher placed on an approved mount at 90 degrees quadrant within approximately 2 minutes. Observation shall be made for proper functioning and the requirements of 3.4.7.

4.5.10 Air Pressure of Packed Sealed Metal Box - The sealed metal box shall be placed in an approved fixture and a measured quantity of air shall be applied to produce the required air pressure. Observation shall be made for leakage. This test is a non-destructive test. Boxes so tested may be returned to the lot.

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5. PREPARATION FOR DELIVERY

5.1 Preservation and Packaging -

5.1.1 Level A - The cartridges shall be preserved and packaged in accordance with dwg. 9209204.

5.1.2 Level C - The metal parts shall be preserved and packaged in accordance with MIL-STD-1169.

5.2 Packing -

5.2.1 Level A - The cartridges, preserved and packaged as specified in 5.1.1, shall be packed in accordance with dwg. 9209205.

5.2.2 Level C - The metal parts, preserved and packaged as specified in 5.1.1, shall be packed for shipment in accordance with MIL-STD-1169.

5.3 Marking - Marking shall be in accordance with Dwg. 9209204, 9209205, MIL-STD-1169 and Code of Federal Regulations, Title 49, Parts 100-199.

5.4 Shipping - When shipments 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.

6. NOTES

6.1 Intended Use - This specification covers the metal parts and loading, assembling and packing for Cartridge, 40MM, Red Star Parachute, M662.

6.2 Ordering Data - See MIL-A-48078.

6.3 Submission of Inspection Equipment Designs for Approval - See MIL-A-48078. Submit equipment designs as required to Commander, Attn: SARPA-QA-T, Picatinny Arsenal, Dover, NJ 07801.

6.4 Submission of Results of Contractor-conducted Examinations and Tests - Data shall be submitted in accordance with data item DI-R-1721 on the DD Form 1423 for the contract.

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6.5 Submission of Test Data - In addition to the normal distribution of records, when the cartridge is procured by the US Army Armament Command, one (1) copy of all ballistic data and ammunition data cards shall be forwarded to: Commander, Picatinny Arsenal, Attn: SARPA-QA-A-S.

6.6 The cartridges will be considered safe to transport providing no evidence exists of loose powder or composition in the box.

6.7 The cartridges will be considered free of damage that will affect the intended function provided the top seal has not been broken by movement or displacement of the top, or the case side has not been distorted sufficiently to prevent ejection of the illuminant assembly.

6.8 Proving Ground Test - Initial production testing shall be conducted in accordance with US Army Test and Evaluation Command Initial Production Test Plan No. CART-40GL-VAR.

6.9 Metal Defective - Nick, crack, dent or sharp edge which might interfere with the proper assembly or end item performance of the item.

6.10 Proving Ground Test Summary:

<u>TEST</u>	<u>SAMPLE SIZE</u>	<u>REQUIREMENTS</u>
<u>Functioning</u>		
(1) First Article		
a. Hot	80	See 3.4.5 & 4.3.3.1
b. Ambient	280	See 3.4.6 & 4.3.3.1
c. Cold	80	See 3.4.7 & 4.3.3.1
(2) First 3 lots		
a. Hot	44	See 3.4.5 & 4.4.3.7
b. Ambient	176	See 3.4.6 & 4.4.3.7
c. Cold	44	See 3.4.7 & 4.4.3.7
(3) Regular Production		
a. Hot	26	See 3.4.5 & 4.4.3.10
b. Ambient	80	See 3.4.6 & 4.4.3.10
c. Cold	26	See 3.4.7 & 4.4.3.10

Custodian:
Army-PA

Preparing Activity:
Army-PA

Project Number: 1310-A094

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