MIL-L-45585D(AR)
12 September 1983
SUPERSEDING
MIL-L-45585C(AR)
15 September 1980

MILITARY SPECIFICATION

LINK CARTRIDGE: METALLIC BELT, 40MM, M16A2

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 one type of link designated as Link Cartridge: Metallic Belt, 40MM, M16A2.

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
DOD-P-16232	-	Phosphate Coatings, Heavy, Maganese or Zinc Base (For Ferrous Metals)
MIL-W-46154	-	Welding, Resistance, Spot and Projection for Fabricating Assemblies of Carbon Steel Sheets

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. DRSMC-QA, Dover, New Jersey 07801 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

MIL-W-63150	-	Weapons and Support Materiel, Standards Quality Assurance Provisions for

STANDARDS

MIL-STD-105	-	Sampling Procedures and Tables for Inspection by Attributes

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

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

DRAWING (SEE 6.10)

U.S. ARMY ARMAMENT RESEARCH AND DEVELOPMENT CENTER

PRODUCT AND PACKING DRAWINGS

11691393	-	Link Cartridge: Metallic Belt, 40MM, M16A2
11691396	-	Test Diagram and Requirements for M16A2 Link

INSPECTION EQUIPMENT DRAWINGS

IEL-11691393	-	Index of Inspection Equipment List
11018350	-	Gage, Simulated Cartridge

AMERICAN SOCIETY FOR TESTING AND MATERIALS

ASTM B 117	-	Standard Method of Salt Spray (Fog) Testing
ASTM E 18	-	Standard Methods of Test for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

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

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 Part. The part shall comply with all requirements specified on Drawing (Dwg.) 11691393, all associated drawings and with all requirements specified in applicable specifications.

3.3 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.

3.4 Functioning. Links shall be assembled into belts using Government standard, M385 Practice ammunition and fired in intermittent bursts of 5 to 15 rounds in a 40mm Grenade Launcher without malfunctioning, cracking, breaking or separating.

3.5 Workmanship. Workmanship shall be in accordance with MIL-W-63150.

4. QUALITY ASSURANCE PROVISIONS

4.1 Reponsibility for inspection and standard quality assurance provisions. Unless otherwise specified herein or in the contract, the provisions of MIL-W-63150 shall apply and are hereby made a part of this detail specification.

4.2 Classification of inspection. The following types of inspection shall be conducted on this item:

a. First Article Inspection (See 4.3)
b. Quality Conformance Inspection (See 4.4)

4.3 First article inspection. (See 3.3)

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

Part Description	Drawings	Quantity
Coupling, Cartridge Link	11691394	405 (5 prior to Oil Treatment)
Loop, Cartridge Link	11691395	215 (110 prior to Coating) (5 prior to Oil Treatment)
Link M16A2	11691393	1500

4.3.2 Inspections to be performed. See TABLE I herein.

4.3.3 Rejection. If any assembly, component or test specimen fails to comply with any of the applicable requirements, the first article sample shall be rejected. The Government reserves the right to terminate its inspection upon any failure of an assembly, component, or test specimen in the sample to comply with any of the stated requirements.

FIRST ARTICLE INSPECTION - TABLE I

CLASSIFICATION OF DEFECTS & TESTS

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PARAGRAPH	TITLE		SHEET 1 OF 1		DRAWING NUMBER SEE BELOW
	Link M16A2 and Components				NEXT HIGHER ASSEMBLY
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
	Coupling, Cartridge Link (Dwg. 11691394)				
	Examination for defects	25			4.4.2.1
	Tensile strength	400			4.5.1
	Salt Spray, prior to oil treatment	5			4.5.2
	Loop, Cartridge Link (Dwg. 11691395)				
	Examination for defects	100			4.4.2.2
	Weld test	10			4.5.3
	Hardness, prior to protective coating	100			4.5.4
	Test for carburization and decarburization, prior to coating	10			4.5.5
	Salt spray, prior to oil treatment	5			4.5.2
	Link M16A2 (Dwg. 11691393)				
	Nose fan, butt fan, twist and free hinging test (See NOTE 1)	500			4.5.6, 4.5.7, 4.5.8, 4.5.9
	Tensile load test (See NOTE 1)	500			4.5.10
	Breakaway force test (See NOTE 2)	500			4.5.11
	Stripping force test (See NOTE 2)	500			4.5.12
	Uncoupling force test (See NOTE 2)	500			4.5.13
	Functioning	500			4.5.15

NOTES:

(1) Fifty (50) belts of ten (10) links each. Same belts shall be used for these tests.
(2) Same links shall be used 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-STD-105. In addition inspection lots shall not exceed 500,000 links per lot. Each inspection lot shall contain:

a. Coupling from one interfix number from one manufacturer.

b. Loops from one heat treat batch.

4.4.1.1 Heat treat batch. The heat treat batch shall consist of loops heat treated in a batch type furnace at one charge or in a continuous type furnace during an uninterrupted period extending over not more than one eight hour shift.

4.4.2 Examination. Examination shall be performed as specified herein.

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				DRAWING NUMBER
4.4.2.1	Coupling, Cartridge, Link		SHEET 1 OF 1		11691394
					NEXT HIGHER ASSEMBLY
					11691393
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
CRITICAL:	None defined				
MAJOR:					
101.	Length, head		0.40%	3.2	11018355
102.	Height, head		0.40%	3.2	11018355
103.	Thickness, head		0.40%	3.2	11018354
104.	Diameter, pivot lug		0.40%	3.2	11018359
105.	Distance, inside between head and pivot lugs		0.40%	3.2	11018216
106.	Diameter, shank		0.40%	3.2	11018217
107.	Tensile strength	315	0-1	3.2	4.5.1
108.	Salt spray, prior to oil treatment	*	*	3.2	4.5.2
MINOR:					
201.	Any radius missing		1.5%	3.2	Visual
202.	Evidence of poor workmanship		2.5%	3.5	Visual

NOTES:

* Sampling and rejection shall be in accordance with DOD-P-16232.

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QUALITY CONFORMANCE INSPECTION

CLASSIFICATION OF DEFECTS & TESTS

MIL-L-45585D(AR)

PARAGRAPH	TITLE				DRAWING NUMBER
4.4.2.2	Loop, Cartridge, Link		SHEET 1 OF 2		11691395
					NEXT HIGHER ASSEMBLY
					11691393
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
CRITICAL:	None defined				
MAJOR:					
101.	Improper forming, segment assembly and welding, distorted diameter. (The finished loop shall be capable of dropping over mandrel, detail A, with a maximum applied weight of two pounds)		0.40%	3.2	11018351
102.	Improper forming, segment assembly and welding, distorted width. (The finished loop shall be capable of dropping freely of its own weight through slot)		0.40%	3.2	11018351
103.	Diameter, pivot hole		0.40%	3.2	8440212
104.	Height, leaf spring		0.40%	3.2	8441408
105.	Height, coupling snap groove		0.40%	3.2	8440212
106.	True position, pivot slot		0.40%	3.2	8440212
107.	Location, top guide surface from horizontal center line (min. and max.)		0.40%	3.2	8440213
108.	Location, bottom guide surface from horizontal center line (min. and max.)		0.40%	3.2	8440213
109.	Location, square loop from vertical center line (min. and max.)		0.40%	3.2	8440213
110.	Location, coupling pivot surface from vertical center line (min. and max.)		0.40%	3.2	8440213

NOTES:

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QUALITY CONFORMANCE INSPECTION

CLASSIFICATION OF DEFECTS & TESTS

MIL-L-45585D(AR)

PARAGRAPH	TITLE		SHEET 2 OF 2		DRAWING NUMBER 11691395
4.4.2.2	Loop, Cartridge, Link				NEXT HIGHER ASSEMBLY 11691393
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
111.	True position requirement not met, snap opening with horizontal center line		0.40%	3.2	8440213
112.	True position requirement not met, square loop height with horizontal center line		0.40%	3.2	8440213
113.	Diameter, coupling pivot hole		0.40%	3.2	8440212
114.	True position requirement not met, coupling pivot hole diameter with snap groove height		0.40%	3.2	8440212
115.	Length location, coupling pivot hole		0.40%	3.2	8440212
116.	Height, square loop		0.40%	3.2	8440212
117.	Outside width, top and bottom guides over (calculated)		0.40%	3.2	8440212
118.	End of outer segment to corner of inner segment		0.40%	3.2	Gage
119.	Salt spray, prior to oil treatment	*	*	3.2	4.5.2
MINOR:					
201.	Thickness, stock		1.5%	3.2	11018215
202.	Height, pivot slot coupling		1.5%	3.2	8440212
203.	True position of top and bottom guides		1.5%	3.2	8440213
204.	Marking misleading or unidentifiable		1.5%	3.2	Visual
205.	Evidence of poor workmanship		2.5%	3.5	Visual

NOTES:

* Sampling and rejection shall be in accordance with DOD-P-16232.

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QUALITY CONFORMANCE INSPECTION

CLASSIFICATION OF DEFECTS & TESTS

MIL-L-45585D(AR)

PARAGRAPH	TITLE				DRAWING NUMBER
4.4.2.3	Link, M16A2		SHEET 1 OF 1		11691396
					NEXT HIGHER ASSEMBLY
					11691393
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
CRITICAL:	None defined				
MAJOR:					
101.	Breakaway force test (See NOTE 1)	500	0.40%	3.2	4.5.11
102.	Stripping force test (See NOTE 1)	500	0.40%	3.2	4.5.12
103.	Uncoupling force test (See NOTE 1)	500	0.40%	3.2	4.5.13
104.	Cleanliness	*	*	3.2	4.5.14
105.	Functioning	144	0-1	3.4	4.5.15

NOTES:

* Sampling and rejection shall be in accordance with MIL-P-116.

(1) Same links shall be used for these tests.

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4.4.3 Testing.

4.4.3.1 Nose fan, butt fan, twist and free hinging test. Twenty (20) belts of ten (10) links each, shall be randomly selected from each lot and subjected to these tests. If any belt fails to meet the applicable drawing requirements, the lot shall be rejected.

4.4.3.2 Tensile load test. After completion of the above tests, the twenty (20) belts of ten (10) links each shall be subjected to this test. If any link fails to meet the applicable drawing requirement, the lot shall be rejected.

4.4.3.3 Hardness of loop, cartridge link. Eighty (80) loops shall be selected from each heat treat batch and subjected to this test. If two (2) or more loops fail the drawing requirements, the heat treat batch represented by the sample shall be rejected.

4.4.3.4 Carburization and decarburization of loop, cartridge link. Three (3) loops shall be selected from each heat treat batch and subjected to this test. If any loop fails the drawing requirement, the heat treat batch represented by the sample shall be rejected.

4.4.3.5 Weld test of loop, cartridge, link. Five (5) loops shall be selected from each hour's production from each welding machine. If any loop fails the weld strength requirement specified on the drawing, the hour's production represented by the sample per welding machine shall be rejected.

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 MIL-W-63150 and 6.3 herein.

4.5 Test methods and procedures

4.5.1 Tensile strength of coupling cartridge link. The coupling shall be tested for tensile strength in accordance with an approved fixture. The coupling shall be held by the pivot lugs and the head. This test is a non-destructive test. Parts so tested may be returned to the lot.

4.5.2 Salt spray of coupling cartridge link and loop, cartridge link. This test shall be conducted in accordance with ASTM B 117. This test is a destructive test. Parts so tested shall not be returned to the lot.

4.5.3 Weld test of loop, cartridge link. This test shall be conducted in accordance with MIL-W-46154 and the gradual loading requirement of the applicable drawing. This test is a destructive test. Parts so tested shall not be returned to the lot.

4.5.4 Hardness of loop, cartridge link. This test shall be conducted in accordance with ASTM E 18. This test is a non-destructive test. Parts so tested may be returned to the lot.

4.5.5 Test for carburization and decarburization of loop, cartridge link. A cross section of the loop shall be polished, etched with a 3 to 5 percent Nital solution and examined under a microscope of not less than 500 power to determine the requirements of the applicable drawing. This test is a destructive test. Parts so tested shall not be returned to the lot.

4.5.6 Nose fan test. Links shall be tested by assembling the links into 10-round belts using 10 simulated cartridge gages conforming to Drawing 11018350. Adjacent link assemblies shall be coupled together prior to inserting the simulated cartridge gages. The simulated cartridge gages shall be inserted into the links so that the link teeth are engaged in the labrinthine grooves of the driving bands. Each belt shall be laid on one side on a level plane surface and drawn into its smallest circular arc with the nose tips of the simulated cartridge gage pointing toward the center of the arc (see Drawing 11691396). Observation shall be made for deformation of parts. This test is a non-destructive test. Parts shall be used for subsequent tests.

4.5.7 Butt fan test. Links shall be tested using the same procedure specified in 4.5.6 except that each belt shall be drawn into its smallest circle arc with the butt ends of the simulated cartridge gage pointed toward the center of the arc (see Drawing 11691396). Observation shall be made for deformation of parts. This test is a non-destructive test. Parts shall be used for subsequent tests.

4.5.8 Twist test. The test shall be conducted with the assembled belt attached by the first link of the belt to an approved holding fixture of the contractor's design. The holding fixture shall be attached to a rigid support in such a manner that will allow the belt to hang freely vertically. A torque shall be applied by hand to the tenth round of the free belt both in a clockwise and counterclockwise direction of rotation (see Drawing 11691396). Observation shall be made for evidence of partical or complete belt separation, disassembly of cartridges from the links or deformation of parts. This test is a non-destructive test. Parts shall be used for subsequent tests.

4.5.9 Free hinging test. Each belt shall be laid out horizontally to its full length and one end shall be drawn back upon the remainder of the belt until the belt is completely reversed. One end of the reversed belt shall then be drawn back upon the remainder of the belt until the belt is returned to its original position (see Drawing 11691396). Observation shall be made for the requirement of the applicable drawing. This test is a non-destructive test. Parts shall be used for subsequent tests.

4.5.10 Tensile load test. Each belt shall be inserted into a test fixture and a tensile load of 400 pounds shall be applied at a speed of 1 to 2 inches per minute on the center line of the belt as specified on Drawing 11691396. Observation shall be made for the requirement of the applicable drawing. This test is a destructive test. Parts so tested shall not be returned to the lot.

4.5.11 Breakaway force test. Each link of the sample shall be tested using test equipment conforming to Drawing 11691396. Links shall be assembled to the test mandrel with the leaf springs of the links seated in the groove of the mandrel. The test mandrel, with the assembled link, shall be inserted into the test fixture and the load shall be applied to the link in the direction to strip the link from the test mandrel. The maximum load required to initially move the link shall be recorded as the breakaway force. Observation shall be made for the requirement of the applicable drawing. This test is a non-destructive test. Parts shall be used for subsequent tests.

4.5.12 Stripping force test. Each link of the sample shall be tested using inspection equipment conforming to Drawing 11018356. Links shall be assembled to the test mandrel with the leaf spring areas of the link seated in the groove of the test mandrel. The test mandrel, with assembled link, shall be inserted into the test fixture and the load shall be applied to the link in the direction to strip the link from the test mandrel (see Drawing 11691396). The maximum load required to strip the link from the test mandrel, excluding the initial force (breakaway) to move the link, shall be recorded as the stripping force. Observation shall be made for the requirement of the applicable drawing. This test is a non-destructive test. Parts shall be used for subsequent tests.

4.5.13 Uncoupling force test. Each link of the sample shall be tested using inspection equipment conforming to IEL 11691393. The links shall be inserted into the test fixture and the load shall be applied in the direction specified on Drawing 11691396 until the links are uncoupled. The maximum load required to uncouple the link shall be recorded as the uncoupling force. The test shall be conducted so that each coupling and each loop in the sample is tested. Observation shall be made for the requirement of the applicable drawing. This test is a destructive test. Parts so tested shall not be returned to the lot.

4.5.14 Determination of cleanliness test. Links shall be tested for cleanliness requirements in accordance with MIL-P-116. This test is a non-destructive test. Parts so tested may be returned to the lot.

4.5.15 Functioning test. Links shall be tested by assembling the links into belts using Government standard 40mm, M385 practice ammunition. The belts shall be fired in intermittent bursts of 5 to 15 rounds using approved 40mm Grenade Launcher mounted in a Government approved mount with standard chuting.

5. PACKAGING

5.1 Preservation and packaging.

5.1.1 Preservation and packaging of the links shall be in accordance with the best commercial pack. Links shall consist of a loop and a coupling not assembled.

6. NOTES

6.1 Intended use. The component covered by this specification is intended for use with 40mm ammunition in the form of flexible belts.

6.2 Ordering data. Procurement documents shall be as specified in the contract.

6.3 Submission of inspection equipment designs for approval. Submit equipments as required shall be forwarded to Commander, US Army Armament Research and Development Center, Dover, NJ 07801, ATTN: DRSMC-QAF-I(D). Request letter of submittal state contractor, contract number, specification number, item nomenclature and classification of defects or test paragraph.

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

6.5 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-A334)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-L-45585D	LINK CARTRIDGE: METALLIC BELT, 40MM, M16A2

3a. NAME OF SUBMITTING ORGANIZATION

b. ADDRESS *(Street, City, State, ZIP Code)*

4. TYPE OF ORGANIZATION *(Mark one)*

- ☐ VENDOR
- ☐ USER
- ☐ MANUFACTURER
- ☐ OTHER *(Specify)*: _____

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)*

(TO DETACH THIS FORM, CUT ALONG THIS LINE.)

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