MIL-L-48176B (AR)
8 May 1985
SUPERSEDING
MIL-L-48176A (PA)
18 March 1977

MILITARY SPECIFICATION

LINER (TITANIUM DIOXIDE AND WAX) FOR USE IN CARTRIDGES

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 Scope. This specification covers liners which essentially consist of titanium dioxide and wax on cartridge cloth or scrim for use in tank and artillery cartridges (see 6.1).

1.2 Classification. Liners covered by this specification shall be of the following types:

Type I	-Army Drawing No. 8865255 - for 90MM
Type II	-Army Drawing No. 8880408 - for 90MM
Type III	-Army Drawing No. 9217050 - for 105MM
Type IV	-Army Drawing No. 9282787 - for 105MM
Type V	-Army Drawing No. 9278961 - for 155MM
Type VI	-Army Drawing No. 9285416 - for 155MM
Type VII	-Army Drawing No. 9207962 (or Army Drawing No. 9217039, Alternate - for 175MM
Type VIII	-Army Drawing No. 9277174 - for 8 Inch
Type IX	-Army Drawing No. 9312728 - for 8 Inch
Type X	-Army Drawing No. 9343011 - for 105MM
Type XI	-Army Drawing No. 9378133 - for 155MM
Type XII	-Army Drawing No. 9349808 - for 105MM

FSC: 1375

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 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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 solicitation, form a part of the specification to the extent specified herein.

SPECIFICATIONS

MILITARY

MIL-P-116	- Preservation, Methods of
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-1169	- Packaging, Packing and Marking for Shipment of Inert Ammunition Components

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

DRAWINGS (see 6.3)

US ARMY ARMAMENT, RESEARCH AND DEVELOPMENT CENTER (ARDC)

8865255	-Liner (90MM)
8880408	-Liner (90MM)
9207962	-Additive Jacket, Bore Wear Reducing XM1 (175 MM)
9207963	-Body Assembly
9209565	-Body and Additive (Alternate)
9209566	-Body Assembly (Alternate)
9211780	-Carton Packing for Additive Jackets, Bore Wear Reducing: XM1 for 175MM Gun M113
9211781	-Box, Packing, for Additive Jackets, Bore Wear Reducing: XM1 for 175MM Gun M113
9217039	-Additive Jacket, Bore Wear Reducing: XM1 (Alternate)

9217050 -Liner (105MM)
9277174 -Liner Assembly (8 Inch)
9278961 -Liner, Additive
9282787 -Liner (105MM)
9282888 -Additive Composition
9285416 -Liner, Additive (155MM)
9312728 -Liner Assembly (8 Inch)
9343011 -Liner (105MM, M490A1)
9349808 -Liner (105MM)
9378133 -Liner Assembly (155MM)

(Copies of drawings, specifications, handbooks, standards 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.)

2.2 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 Materials. Materials shall be in accordance with the applicable drawings and specifications (see 6.4).

3.2 Liner. The liner shall comply with all requirements specified on drawings (dwgs) 8865255, 8880408, 9207962, 9217039, 9217050, 9277174, 9278961, 9282787, 9285416, 9312728, 9343011, 9349808 or 9378133 as applicable and associated drawings and with all requirements specified in applicable specifications.

3.3 Additive composition. The additive composition coated on the liner shall comply with drawings 9207963, 9209565, 9277174, 9278961, 9282888, 9285416, 9312728 or 9378133 as applicable, when tested as specified in 4.5.1

3.4 First article inspection. This specification contains provisions for first article inspection. Requirements for the submission of first article samples by the contractor shall be as specified in the contract.

3.5 Workmanship. The liner shall be fabricated in a thorough workmanlike manner. It shall be free of tears, wrinkles, dirt, grease and other foreign matter. The additive coating shall be uniform. Irregularities, such as lumps and mounds, are permitted on the surface of the additive coating as long as they are not loose nor excessive in number or size.

4. QUALITY ASSURANCE PROVISIONS

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

4.2 Classification of inspections. 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.

4.3.1 Submission. The contractor shall submit a first article sample as designated by the contracting officer for evaluation in accordance with provisions of 4.3.2. The first article sample shall consist of ten (10) liners prior to sewing and ten liners after sewing (when applicable), per production line. The sample shall be obtained from a production batch which has been produced by the contractor using the same production processes, procedures and equipment as will be used in fulfilling the contract. All materials shall be obtained from the same sources of supply as will be used in regular production.

4.3.2 Inspection to be performed. See MIL-A-48078

4.3.3 Rejection. See MIL-A-48078

4.4 Quality conformance inspection.

4.4.1 Inspection lot formation. Inspection lots shall comply with the lot formation provisions of MIL-A-48078. Inspection lots for liners produced by the batch process shall consist of one batch of additive liners produced by one manufacturer in accordance with the same specification, or same specification revision under one continuous set of operating conditions. For continuously produced liners, an inspection lot shall consist of no more than that quantity of liners produced in one (1) shift's production on one line produced in accordance with the same specification, or same specification revision, under one continuous set of operating conditions.

4.4.2 Examination. 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 (See MIL-A-48078).

QUALITY CONFORMANCE INSPECTION

CLASSIFICATION OF DEFECTS & TESTS

MIL-L-48176B (AR)

PARAGRAPH	TITLE		SHEET 1 OF 1		DRAWING NUMBER
4.4.2.1	Liner, after coating - All types				See applicable drawing
					NEXT HIGHER ASSEMBLY
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
Critical	None defined				
Major					
101	Weight		0.40%	3.2	Balance
102	Surface coverage, minimum (min.)		0.40%	3.2	Visual/Scale
103	Length		0.40%	3.2	Scale
104	Width		0.40%	3.2	Scale
105	Liner torn		0.65%	3.2	Visual
Minor					
201	Length of slits (applicable to 105MM liners Type IV and Type X)		0.65%	3.2	Scale
202	Evidence of poor workmanship (other than liner torn)		1.0%	3.5	Visual

NOTES:

AMSMC Form 1570, 1 Feb 85

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

CLASSIFICATION OF DEFECTS & TESTS

PARAGRAPH	TITLE		1 SHEET of		DRAWING NUMBER
4.4.2.2	Liner after being covered with polyester film and sewn (applicable to 90, & 105MM liners) (Types I through IV, X, and XII)				See applicable drawing
					NEXT HIGHER ASSEMBLY
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
Critical	None defined				
Major					
101	Polyester film missing or improperly assembled		0.40%	3.2	Visual
102	Polyester film tear or hole along seam (see note)		0.40%	3.2	Visual
103	Stitching missing or defective		0.40%	3.2	Visual
Minor					
201	Location of seam to liner edge		1.0%	3.2	Scale
202	Length of exposed area (no polyester film) on back of liner		1.0%	3.2	Scale
203	Distance from center seam to outer edge of film overlap (Type III only)		1.0%	3.2	Scale
204	Distance from outer edge of film overlap to inner edge of film (Type III only)		1.0%	3.2	Scale
205	Extension of polyester film past edge of liner, maximum (max.)		1.0%	3.2	Visual
206	Evidence of poor workmanship		1.0%	3.5	Visual

NOTES: Liners with tears or holes in the polyester film are permissable only if the tears or holes: 1) Have a linear dimension of 3/16 inch max. 2) Are located outside a seam next to the edge of the liner. 3) Are not more than three per liner.

QUALITY CONFORMANCE INSPECTION

CLASSIFICATION OF DEFECTS & TESTS

MIL-L-48176B (AR)

PARAGRAPH	TITLE			DRAWING NUMBER
4.4.2.3	Liner after being covered with liner backing and sewn (applicable to 155MM, Type XI liner)	1 SHEET 1 OF		9378133
				NEXT HIGHER ASSEMBLY

CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
Critical	None defined				
Major					
101	Liner backing missing, torn or improperly assembled		0.40%	3.2	Visual
102	Flap missing, torn or improperly assembled (2)		0.40%	3.2	Visual
103	Stitching missing or defective		0.40%	3.2	Visual
Minor					
201	Location of seam to liner edge		1.0%	3.2	Scale
202	Length of exposed area (no liner backing) on back of liner		1.0%	3.2	Scale
203	Extension of liner backing past edge of liner, max.		1.0%	3.2	Scale
204	Evidence of poor workmanship		1.0%	3.5	Visual

NOTES:

DRDAR-QA Form 160 Jul 77

QUALITY CONFORMANCE INSPECTION

CLASSIFICATION OF DEFECTS & TESTS

MIL-L-48176B (AR)

PARAGRAPH	TITLE	SHEET	DRAWING NUMBER
4.4.2.4	Body assembly (applicable to 175MM additive Jackets) (Type VII only)	1 OF 1	9209566 or 9207963, as applicable
			NEXT HIGHER ASSEMBLY 9217039 or 9207962, as applicable

CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
Critical	None defined				
Major					
101	Polyester film missing or improperly assembled		0.40%	3.2	Visual
102	Polyester film tear or hole along seam (see note)		0.40%	3.2	Visual
103	Stitching missing or defective		0.40%	3.2	Visual
Minor					
201	Location of seam to liner edge		1.0%	3.2	Scale
202	Evidence of poor workmanship		1.0%	3.5	Visual

NOTES: Liners with tears or holes in the polyester film are permissable only if the tears or holes: 1) Have a linear dimension of 3/16 inch max. 2) Are located outside a seam next to the edge of liner. 3) Are not more than three per liner.

DRDAR-QA Form 160 Jul 77

QUALITY CONFORMANCE INSPECTION

CLASSIFICATION OF DEFECTS & TESTS

MIL-L-48176B (AR)

PARAGRAPH	TITLE		SHEET 1 OF 1		DRAWING NUMBER
4.4.2.5	Additive jacket, bore wear reducing 175MM				9207962 or 9217039, as applicable
					NEXT HIGHER ASSEMBLY
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
Critical	None defined				
Major					
101	Stitching missing or defective		0.40%	3.2	Visual
102	Component missing or improperly assembled		0.40%	3.2	Visual
Minor					
201	Width of body		1.0%	3.2	Visual
202	Evidence of poor workmanship		1.0%	3.5	Visual

NOTES:

DRDAR-QA Form 160 Jul 77

CLASSIFICATION OF DEFECTS & TESTS

PARAGRAPH	TITLE		SHEET 1 OF 1		DRAWING NUMBER
4.4.2.6	Carton, sealed (applicable to 175MM additive jacket)				9211780
					NEXT HIGHER ASSEMBLY
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
Critical	None defined				
Major					
101	Carton improperly sealed		0.40%	5.1	Visual
102	Carton damaged		0.40%	5.1	Visual
103	Contents shift within the carton		0.40%	5.1	Manual
104	Marking incorrect, misleading or illegible		0.65%	5.1	Visual
Minor	None defined				

NOTES:

DRDAR-QA Form 160 Jul 77

CLASSIFICATION OF DEFECTS & TESTS

MIL-L-48176B (AR)

PARAGRAPH	TITLE		SHEET		DRAWING NUMBER
4.4.2.7	Barrier Bag, sealed (applicable to 175MM Additive Jacket)		1 of 1		9211780
					NEXT HIGHER ASSEMBLY
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
Critical	None defined				
Major					
101	Heat-sealed seam test failure		*	3..2	4.5.2/Heat-sealed seam test
102	Bag punctured, torn or cut		0.40%	5.1	Visual
Minor	None defined				

NOTES: *The AQL shall be as specified in the Heat-sealed seam test.

CLASSIFICATION OF DEFECTS & TESTS

MIL-L-48176B (AR)

PARAGRAPH	TITLE	SHEET	DRAWING NUMBER
4.4.2.8	Box, Packing (applicable to 175 MM Additive Jacket)	1 OF 1	9211781
			NEXT HIGHER ASSEMBLY

CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
Critical	None defined				
Major					
101	Board broken or loose		0.40%	5.2	Visual/Manual
102	Hardware or strapping missing, broken or loose		0.40%	5.2	Visual/Manual
103	Marking incorrect, misleading or illegible		0.65%	5.2	Visual
104	Contents shift within box		0.40%	5.2	Manual
Minor					
201	Protruding nail		0.65%	5.2	Visual
202	Car seal missing, unsealed or improperly positioned		0.65%	5.2	Visual

NOTES:

4.4.3 Testing

4.4.3.1 Batch process sampling.

4.4.3.1.1 Batch process sampling for titanium dioxide and organic material content (see 3.3), Major defects. The liners shall be sampled in accordance with MIL-STD-105, Special Inspection Level S-3, double sampling plan, with an AQL of 2.5 percent. The samples shall be tested in accordance with 4.5.1.1 and 4.5.1.2. An inspection lot will be stated in 4.4.1.

4.4.3.1.2 Batch process sampling for dacron staple content, (see 3.3), Major defect. The liners shall be sampled in accordance with MIL-STD-105, Special Inspection Level S-1, double sampling plan, with an AQL of 10 percent. Beginning with the first lot produced and continuing until three consecutive lots have met the dacron staple content, as specified in 3.3, the samples shall be tested in accordance with 4.5.1.3. Samples from subsequent lots shall be tested in accordance with 4.5.1.4 (see 6.5 for consecutive lot considerations). An inspection lot will be as stated in 4.4.1.

4.4.3.2 Continuous process sampling.

4.4.3.2.1 Continuous process sampling for titanium dioxide and organic material content (see 3.3), Major defects. The liners shall be sampled in accordance with MIL-STD-105, Special Inspection Level S-3, double sampling plan, with an AQL of 2.5 percent, with samples randomly selected to proportionally represent the liners manufactured over the entire inspection lot. An alternate sampling plan may be used as follows:

From each production line, one liner shall be randomly selected at the start, and approximately every hour thereafter during the production run of the inspection lot. If any liner fails to comply with the applicable test requirement, one liner shall be randomly selected from the succeeding and preceding production in intervals of approximately 50 liners from that line, in each direction independently, until an acceptable test result is obtained. All liners between the two satisfactory samples (liners) shall be removed from the lot. The samples shall be tested in accordance with 4.5.1.1 and 4.5.1.2. An inspection lot will be as stated in 4.4.1.

4.4.3.2.2 Continuous process sampling for dacron staple content (see 3.3), Major defect. The liners shall be sampled in accordance with MIL-STD-105, Special Inspection Level S-1, double sampling plan with an AQL of 10 percent. Beginning with the first lot produced and continuing until three consecutive lots have met the dacron staple content, as specified in 3.3, the samples shall be tested in accordance with 4.5.1.3. Samples from subsequent lots shall be tested in accordance with 4.5.1.4 (see 6.5 for consecutive lot considerations). An inspection lot will be as stated in 4.4.1.

4.4.4 Inspection equipment. The government reserves the right to inspect the contractor's equipment and determine that he has available and utilizes correctly, measuring and test equipment of the required accuracy and precision and that the instruments are of the proper type and range to make measurements of the required accuracy. Commercial inspection equipment shall be employed where applicable for all tests and examinations specified in 4.5. The contractor is responsible for assuring that proper calibration procedures are followed. Government approval of all inspection equipment is required prior to its use for acceptance purposes (see 6.6).

4.5 Methods of inspection (see 6.7). The tests in 4.5.1 shall be performed using prescribed analytical procedures for replicate determination given in standard analytical textbooks.

4.5.1 Determination of additive composition.

4.5.1.1 Titanium dioxide content.

4.5.1.1.1 Gravimetric method. Peel off the polyester film (or liner backing) from the liner, if applicable. Remove approximately one (1) gram of the additive from the cloth. Accurately weigh the specimen and transfer it to a tared crucible. The crucible and contents shall be ignited with a bunsen-burner until the flame is no longer visible. The crucible shall be transferred to a muffle furnace maintained at 700 +5°C and heated until all organic matter is burned off. The sample shall be cooled in a dessicator, then weighed. The gain in weight of the tared crucible shall be considered to be titanium dioxide. Calculate the percent titanium dioxide as follows:

$$\text{Percent titanium dioxide} = \frac{A}{W} \times 100$$

Where: A = Weight of residue, grams
W = Weight of sample, grams

4.5.1.1.2 Alternate method 1, thermogravimetric method of analysis.

4.5.1.1.2.1 Apparatus. Dupont Model 951 thermogravimetric analyzer with the Model 990 thermal analyzer console, or equivalent apparatus.

4.5.1.1.2.2 Procedure. Peel off the polyester film (or liner backing) from the liner, if applicable. Remove approximately 100 milligrams (mg) of the additive from the cloth. Accurately weigh the specimen in a tared platinum pan on the microbalance of the thermogravimetric analyzer. Insert the micro-balance assembly into the furnace, which has been maintained at 640 ± 10°C and is being constantly flushed with an inert gas such as argon, helium or

nitrogen at a rate of 100 to 200 milliliters per minute. Heat the specimen to constant weight. Remove the micro-balance assembly from the furnace, cool to room temperature and weigh the pan and residue. Consider the contents of the pan to be titanium dioxide, and calculate the percent titanium dioxide as specified in 4.5.1.1.1.

4.5.1.1.2 Alternate method 2, x-ray flourescence method of analysis.

4.5.1.1.2.1 Apparatus. Oxford Lab-X-2000 (energy dispersive x-ray fluorescence spectrometry) with an Iron 55 radiation source or equivalent apparatus.

4.5.1.1.2.2 Sample preparation. Collect additive material which shall be representative of all areas of the liner. Put the material in a mold (which will be used in a press). Pelletize the material, using a laboratory press at a pressure of 10,000 pounds per square inch (psi) $\pm$ 100 psi, for a period of fifteen seconds, minimum. The resulting pellet shall be of sufficient diameter to completely cover the analysis head opening. This is the area of sample port through which the bombarding x-rays are introduced to the sample.

4.5.1.1.2.3 Procedure. Calibrate the instrument using concentration standards. Establish a calibration curve (x-ray count per second versus concentration). Introduce the sample into the instrument and determine the radiation count per second. From the calibration curve, determine the concentration.

4.5.1.2 Organic matter. Determine the organic matter (consisting of wax, dacron fiber and stearyl alcohol) by subtracting the percent titanium dioxide obtained (see 4.5.1.1) from one hundred (100).

4.5.1.3 Dacron staple content. Peel off the plastic film (or liner backing) from the liner, if applicable. Remove approximately five (5) grams of the additive from the cloth. Accurately weigh the specimen to the nearest 0.1 mg, and record the weight. Place the specimen in a previously ignited (at approximately 700°C), and tared (to the nearest 0.1 mg) gooch crucible (of approximately 25 ml capacity), or equivalent crucible. Suspend the crucible plus sample in a 30 ml beaker and place on a steam bath. A temperature-regulated hot plate may be used instead of a steam bath. (The hot plate shall not have heating elements which can be exposed to liquid or vapors). Fill the crucible to approximately two-thirds capacity with toluene which was previously heated. Cover the crucible and beaker with an inverted 400 ml beaker. Add more hot toluene, as necessary, until the wax and stearyl alcohol have been extracted as evidenced by a remaining shapeless layer of titanium dioxide and dacron staple (fiber) on the asbestos mat. Remove the crucible, place on a filtering flask and extract any remaining soluble material with 20 ml portions of hot toluene. Repeat two or three times as necessary. Aspirate the crucible for five to ten

minutes to remove the solvent. Place the crucible and residue in an oven at 100° ± 5°C and dry to constant weight. Then repeat extraction with two 20 ml portions of hot solvent using the filtering flask. Aspirate thoroughly and again dry in an oven at 100° ± 5°C, cool in a desiccator and weigh, thus insuring that all the soluble material is extracted. Calculate the wax and stearyl alcohol (when applicable) as follows:

$$\% \text{ wax and stearyl alcohol} = 100 \times \frac{(A - B)}{C}$$

Where A = weight of crucible and sample, grams
B = weight of crucible and residue, grams
C = original weight of sample, grams

Then ignite the crucible at approximately 700°C, cool in a desiccator, weigh and record the weight of the ignited crucible. Calculate the percent dacron as follows:

$$\% \text{ Dacron} = 100 \times \frac{(B - D)}{C}$$

Where B = weight of the crucible and residue, grams
C = original weight of sample, grams
D = weight of crucible and ignited residue ($Ti0_2$) grams

A check of the calculation may be performed as follows:

$$\% \text{ of } Ti0_2 = 100 \times \frac{(D - E)}{C}$$

Where C = original weight of sample, grams
D = weight of crucible and ignited residue ($Ti0_2$) grams
E = tare of crucible, grams

Total = ((wax of stearyl alc) % + $Ti0_2$)

% Dacron = 100 - Total

4.5.1.3.1 Dacron staple content, alternate method. Weigh the specimen as stated in 4.5.1.3. Place the specimen in a clean beaker or evaporating dish. Cover the sample with hot toluene. Place on a steam bath (or a hot plate as specified in 4.5.1.3) to dissolve the wax and stearyl alcohol. Assemble suction filteration apparatus including an ignited, tare (to the nearest 0.1 mg) gooch crucible or equivalent crucible. Allow the dacron staple and titanium dioxide to settle in the beaker (or evaporating dish) while still on the steam bath. Decant the solution through the crucible. Wash the residue in the beaker (or evaporating dish) several times with streams of hot toluene and pour it through the

crucible. Wash with hot toluene and aspirate the crucible thoroughly to remove the toluene. Place the crucible and residue in an oven at 100° ± 5°C, dry to constant weight and record the weight. Calculate the wax and stearyl alcohol (when applicable) and continue the procedure as specified in 4.5.1.3.

4.5.1.4 Dacron staple inspection. From each sample, cut approximately one square inch specimens from two opposite diagonal corners. Peel off the plastic film (or liner backing), if applicable. Then, peel the additive coating from the cloth. Break each piece by bending in half and separate the additive coating by pulling approximately 1/16" to 3/16" apart. Visually verify the presence of dacron staple in both specimens. If either specimen lacks dacron staple, the staple shall be classed defective.

4.5.2 Heat sealed seam test of barrier bag. The sampling, acceptance criteria and test procedures for this test shall be in accordance with MIL-P-116 for "Heat-Sealed Seam Test."

5. PACKAGING

5.1 Packaging.

5.1.1 Level A. Packaging for Type VII (Additive Jacket for 175MM) shall be in accordance with drawing 9211780. Packaging for all other types of liners shall be in accordance with Level A of MIL-STD-1169.

5.1.2 Level B. Packaging for Type VII shall be in accordance with 5.1.1 (Level A, Drawing 9211780). Level B packaging is not required for other types of liners.

5.2 Packing.

5.2.1 Level A. Type VII liners shall be packed in accordance with drawing 9211781. All other types of liners shall be packed in accordance with Level A of MIL-STD-1169.

5.2.2 Level B. Type VII liners shall be packed per 5.2.1 (Level A, drawing 9211781). All other types of liners shall be packed in accordance with Level B of MIL-STD-1169.

6 NOTES

6.1 Intended use. The additive liners covered by this specification are intended for use in the following cartridges:

M431A2	Heat-T Cartridge (90MM)
M318A1, M353A1	TP-T Cartridge (90MM)
M490, M456A1, M735, M774, M833	Cartridge (105MM)
M490A1	Cartridge (105MM)
M724A1, M728, M392A1	APDS-T Cartridge (105MM)
M203	Propelling charge (155MM)
M203E2	Propelling charge (155MM)
XM201E5	Propelling charge (155MM)
M86A2	Propelling charge (175MM)
M188	Propelling charge (8 Inch)
M188E1 (A1)	Propelling charge (8 Inch)

6.2 Ordering data. See MIL-A-48078. Procurement documents should also specify the type of additive liner required.

6.3 Drawings. Drawing 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 US Army Research and Development Command (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.

6.4 Liners with lead foil. The 155MM and 8 inch liners (Types V, V, VII, IX and XI) contain lead foil on one side of the cloth. These liners do not have polyester film.

6.5 Change in production. If the contractor changes production from one liner to another it is not necessary to restart the sampling plan (4.4.3.1.2 and 4.4.3.2.2 respectively). The sampling plan shall just continue for the liner from where it was stopped. It is only necessary to restart the sampling plan from the beginning where there is a lapse in production of ninety (90) days or more for any particular liner.

6.6 Submission of inspection equipment designs for approval. See MIL-A-48078. Submit equipment designs, for major defects, to Commander, US Army Armament Research and Development Center, ATTN: AMSMC-QAR-I, Dover, NJ 07801-5001.

6.7 Equivalent test methods. Prior approval of the Contracting Officer is required for use of equivalent test methods. A description of the proposed method should be submitted

through the Contracting Officer to: Commander, US Army Armament Research and Development Center, ATTN: AMSMC-QAR-Q, Dover, NJ 07801-5001. This description should include but not be limited to the accuracy and precision of the method, test data demonstrating the accuracy and precision and drawings of any special equipment required.

6.8 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: 1375-A297)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-L-48176B	LINER (TITANIUM DIOXIDE AND WAX) FOR USE IN CARTRIDGES

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)*

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