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MIL-C-43303B

8 November 1971

SUPERSEDING

MIL-C-43303A

16 October 1968

MILITARY SPECIFICATION

CORD, ELASTIC COTTON

This specification is mandatory for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope.- This specification covers elastic cord encased within a braided cotton cover.

1.2 Classification.- The cord shall be of the following classes as specified (see 6.2):

Class 1 - General purpose.

Class 2 - Special purpose.

* 2. APPLICABLE DOCUMENTS

2.1 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

FEDERAL

UU-T-81 - Tags, Shipping and Stock.

MILITARY

MIL-C-3131 - Cordage; Preparation for Delivery Of.

FSC 8305

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STANDARDS

FEDERAL

- FED-STD-191 - Textile Test Methods.
- FED-STD-601 - Rubber, Sampling and Testing.

MILITARY

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

(Copies of specifications, standards, and drawings required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

- * 3.1 Government and supplier purchases.- The requirements specified in 3.7 and 3.8 apply only to cord purchased directly by the Government. All other requirements apply to cord purchased by a supplier as a component for an end item and to cord purchased directly by the Government.

3.2 Standard sample.- The dyed cord shall match the standard sample for shade and shall be equal to or better than the standard sample with respect to all characteristics for which the standard sample is referenced (see 6.3).

3.3 Material.-

3.3.1 Cotton.- The cotton used in the fabrication of the cord shall be of suitable staple length and grade to meet the requirements of this specification.

3.3.2 Elastic strands.- The elastic strands shall be made of compounded natural rubber, synthetic rubber, or a mixture thereof. The strands shall be of the gage specified in table I, when tested as specified in 4.2.1.

3.4 Color.- The color of the cord shall be natural or dyed as specified (see 6.2). When dyed cord is specified the cotton yarn shall be dyed before braiding. The color (shade) matching test shall be as specified in 4.3. The use of dyes and compounds containing elementary sulfur capable of oxidation to sulfuric acid is prohibited. The dyestuff shall be chosen and applied so that the dyed and finished cotton yarn shall contain no more labile sulfur than shown by the standard sample when tested as specified

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in 4.2.1. When a standard sample is not available the dyed and finished cotton yarn shall show no more than a slight trace of labile sulfur as defined in the test method when tested as specified in 4.2.1.

3.4.1 Colorfastness.— The dyed cord shall show fastness to combined laundering and bleaching equal to or better than the standard sample when tested as specified in 4.3. When no standard sample is available the dyed cord shall show "good" fastness to combined laundering and bleaching when tested as specified in 4.3.

3.5 Physical requirements.— The finished cord shall conform to the physical requirements as shown in table I when tested as specified in 4.3.

TABLE I.— Physical requirements and construction

Diameter inch	Weight oz/lin. yd. (minimum)	Elastic strands	Carriers	Cotton yarn size + 2 counts cover core	Picks per inch (min)	Rubber gage (maximum fineness)
3/16 + 1/32	0.18	7	16 carriers 1 end per carrier	20/2 20/1	26	36
-or-						
			8 carriers 2 ends per carrier			

3.5.1 Core.— The core shall be composed of seven ends of rubber, each end shall be individually wrapped first with four ends of 20/1 cotton yarn, S-twist and overwrapped with one end of 20/1 cotton yarn, Z-twist.

3.5.2 Cover.— The cover shall be braided over the core in a basket weave construction with the carriers braiding in pairs.

3.6 Elongation and set.—

3.6.1 Class 1.— The class 1 cord shall have an elongation in the range of 117 through 143 percent when tested as specified in 4.3.

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3.6.2 Class 2.-

3.6.2.1 Initial elongation.- The class 2 cord shall have initial elongation in the range of 117 through 143 percent when tested as specified in 4.3.

3.6.2.2 Elongation after accelerated aging.- The change in elongation of the class 2 cord after accelerated aging shall be not more than 20 percent when tested as specified in 4.3.

3.6.2.3 Low temperature elongation.- The class 2 cord after subjection to a temperature of -40°F . shall retain not less than 20 percent of its initial elongation when tested as specified in 4.3.

3.6.2.4 Permanent set.- The class 2 cord shall have an initial permanent set of not more than 8.0 percent when tested as specified in 4.3.

3.6.2.5 Permanent set after accelerated aging.- The change in permanent set of the class 2 cord after accelerated aging shall be not more than 20 percent when tested as specified in 4.3.

3.7 Put-up.- Unless otherwise specified (see 6.2) the cord shall be put-up on spools (reels), flat head type, containing 144 yards \pm 2 yards, with not more than three pieces per spool and no one piece less than 10 yards in length. The cord shall be wound on the spools (reels) so that each turn and layer is free from entanglement.

3.8 Identification.- Each spool (reel) of cord shall have a ticket (identification tag) or label attached to it for identification purposes. The ticket shall conform to the requirements for type B, class 1, size 4 or 5 of UU-T-81. The ticket shall be made of not less than 15-point paper stock and shall have a minimum tearing resistance of both directions (total) of 850 grams when tested as specified in UU-T-81. When labels are used, the label shall be attached in such a manner as to remain in place and be clearly legible until all cord has been removed. The ticket or label shall be legibly printed, stamped or typed with water insoluble ink. Handwritten entries shall be prohibited. The ticket or label shall contain the following information:

Stock number
Item description
Specification number
Length
Contract number and date
Date of manufacture
Supplier's name

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3.9 Workmanship.- The fabricated cord shall conform to the quality and grade of product established by this specification. The occurrence of defects shall not exceed the applicable acceptable quality levels.

4. QUALITY ASSURANCE PROVISIONS

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

4.1.1 Certificate of compliance. Where certificates of compliance are submitted, the Government reserves the right to check test such items to determine the validity of the certification.

4.2 Inspection.- Sampling for inspection shall be performed in accordance with MIL-STD-105, except where otherwise indicated hereinafter.

4.2.1 Component and material inspection.- In accordance with 4.1, above components and materials shall be inspected and tested in accordance with all the requirements of referenced specifications, drawings, and standards unless otherwise excluded, amended, modified or qualified in this specification or applicable purchase document. In addition, inspection shall be performed for the requirements in table II.

TABLE II.- Component tests

Characteristic	Paragraph reference	Test method
Cotton yarns:		
Material	3.3.1	1200 <u>1/</u> <u>2/</u>
Cover (ply)	3.5.2	4021 <u>1/</u> <u>2/</u>
Core (singles)	3.5.1	4021 <u>1/</u> <u>2/</u>
No. of yarns	3.5.1	Visual <u>1/</u>
Direction of twist	3.5.1	4050 <u>1/</u> <u>2/</u>
Labile sulfur	3.4	2020 <u>2/</u>

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TABLE II.- Component tests (cont'd)

Characteristic	Paragraph reference	Test method
Elastic strands:		
Material	3.3.2	<u>1/</u>
Gage	3.3.2	4.3.7 <u>1/</u>

1/ A certificate of compliance shall be submitted and will be acceptable for the stated requirements.

2/ Refers to test method of FED-STD-191.

4.2.2 End item examination.-- Defects found during the examination of the end item shall be classified in accordance with 4.2.2.1, 4.2.2.2 and 4.2.2.3.

4.2.2.1 Yard-by-yard examination.-- The required yardage of each spool shall be inspected and visual defects classified as listed in table III. All defects found shall be counted regardless of their proximity to one another. A continuous defect shall be counted as one defect for each linear yard, or fraction thereof in which it occurs. The sample unit shall be one linear yard. The sample size shall be in accordance with level I of MIL-STD-105. The acceptable quality level shall be 2.5 total defects per 100 units. The lot size shall be expressed in units of one linear yard each. An approximate equal number of yards shall be examined from each spool selected. The number of spools from which the sample is to be selected shall be in accordance with table IV of this specification.

TABLE III.- Visual defects

Core not completely covered
Cut or tear, any
Broken or missing end or carrier
Spot or stain <u>1/</u>
Abrasion mark, resulting in a weak place
Unevenly braided resulting in open place, break in continuity of braid or soft spot.

1/ Clearly visible at normal inspection distance (approximately 3 feet).

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4.2.2.2 Overall examination.- Each defect listed below shall be counted no more than once in each spool examined. The sample unit shall be one spool. The sample size and acceptance number shall be as shown in table IV. The lot size shall be expressed in units of 1 yard each.

Defects

Offshade, mottled, or uneven color, when dyed.

Not clean throughout.

Objectionable odor.

Improperly wound resulting in kinking, knotting, entangling or slippage during unwinding or otherwise affecting free unhampered unwinding of cord.

TABLE IV.- Sample size in spools and acceptance number

<u>Lot size in yards</u>	<u>Sample size in spools</u>	<u>Maximum number of defects acceptable in sample</u>
Up to 1,200	3	0
1,201 up to and including 3,200	5	0
3,201 up to and including 10,000	8	0
10,001 up to and including 35,000	13	0
35,001 up to and including 150,000	20	1
150,001 and over	32	2

4.2.2.3 Examination for length per individual spool.- The evaluation of the length requirements are based on a completely relaxed cord. Each spool in the sample shall be examined for length. The sample unit for this examination shall be one spool of cord. The lot size shall be expressed in units of one yard each. The sample size and acceptance number shall be as specified in table IV. Defects with regard to length shall be considered to exist if any of the following are determined during inspection:

- a. The total length of cord on any spool is less or more than length specified (including permitted tolerances).
- b. Length of cord on spool more than 2 yards less than length marked on ticket.
- c. More than 3 pieces of cord per spool.
- d. Any piece of cord on spool less than 10 yards in length.

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4.2.2.4 Total yardage in sample.- No AQL is applicable to the examination for total yardage. The number of spools examined under 4.2.2.3 shall be utilized in determining the total yardage. A lot shall be unacceptable if the total of the actual yardage of cord per individual spool in the sample is less than the total yardage marked on the label or ticket.

* 4.2.3 Examination of preparation for delivery requirements.- An examination shall be made to determine that the packaging, packing and marking comply with the section 5 requirements. The examination shall be in accordance with the provisions of MIL-C-3131, except that the inspection level shall be S-2 and the AQL shall be 2.5 defects per 100 units.

* 4.3 Testing of the end item.- The methods of testing specified in FED-STD-191, wherever applicable and as listed in table V shall be followed. The physical and chemical values specified in section 3 apply to the average of the determinations made on a sample unit for test purposes as specified in the applicable test method. When the data in the "Number of determinations" and "Results reported as" columns are not specified in the table, they shall be as required by the referenced test method. All physical tests shall be conducted on specimens in moisture equilibrium with Standard Conditions as defined in FED-STD-191, including those making references to FED-STD-601. The sample size shall be as follows:

<u>Lot size (yards)</u>	<u>Sample size</u>
800 or less	2
801 up to and including 22,000	3
22,001 and over	5

The sample unit shall be 7 yards of cord. The lot size shall be expressed in units of 1 linear yard. The lot shall be unacceptable if one or more units fail to meet any requirement specified. All test reports shall contain the individual values utilized in expressing the final result.

TABLE V.- Test methods

<u>Characteristic</u>	<u>Requirement paragraph</u>	<u>Test method</u>	<u>No. of determinations per individual sample unit</u>	<u>Results reported as</u>
Diameter	3.5	Micrometer	5	To nearest 1/32 inch

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TABLE V.- Test methods (cont'd)

Characteristic	Requirement paragraph	Test method	No. of determinations per individual sample unit	Results reported as
Weight	3.5	4.3.5	5	Average of 5 determinations to nearest 0.01 ounce
Total number of elastic strands	3.5	Visual	1	Pass or fail
Number of carriers	3.5	Visual	1	Pass or fail
Ends of carriers	3.5	Visual	1	Pass or fail
Picks per inch	3.5	4.3.4	5	Nearest whole number
Color (shade) matching	3.4	4.3.6	1	Pass or fail
Colorfastness:				
Combined laundering and bleaching	3.4.1	5605	-	-
Weave	3.5.2	Visual	1	Pass or fail
Elongation:				
Initial (classes 1 and 2)	3.6.1 and 3.6.2.1	4.3.1	3	Nearest 0.1 percent
After accelerated aging (class 2)	3.6.2.2	4.3.1 and Method 7221 of FED-STD-601 <u>1/</u>	3	Nearest 0.1 percent
Low temperature (class 2)	3.6.2.3	4.3.3	3	Nearest 0.1 percent

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TABLE V.- Test methods (cont'd)

Characteristic	Requirement paragraph	Test method	No. of determinations per individual sample unit	Results reported as
Permanent set:				
Initial (class 2)	3.6.2.4	4.3.2	3	Nearest 0.1 percent
After accelerated aging (class 2)	3.6.2.5	4.3.2 and Method 7221 of FED-STD-601 <u>1/</u>	3	Nearest 0.1 percent

1/ Method 7221 except that accelerated aging shall be carried out at a temperature of 212° F. for 70 hours.

4.3.1 Elongation.- A 14-inch specimen shall be cut from a representative sample of cord and 2 marks made on the cord so that a distance of 10 inches shall be between the gage marks. The cord is suspended from a clamp in such a manner as to allow the two-pound weight to be hung on the lower end. The weight shall be gradually lowered until the entire load is carried by the cord. After two minutes a measurement is taken between the two marks and the increase in length is calculated as follows:

$$\frac{B - A}{A} \times 100 = \text{percent elongation}$$

A - Initial measurement

B - Measurement of elongation at 2 pounds

4.3.2 Permanent set.- A 14-inch test specimen shall be marked so that a distance of 10 inches is between the gage marks and then shall be stretched 50 percent (5 inches) and held there for 24 hours under laboratory conditions. The sample shall then be released and allowed to rest for 10 minutes. The extension remaining shall be measured and expressed as a percentage of the original distance between the gage marks. The calculation of permanent set shall be calculated as follows:

$$\frac{B - A}{A} \times 100 = \text{permanent set}$$

A - Initial measurement

B - Measurement after permanent set

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4.3.3 Low temperature elongation test.- A 14-inch test specimen of cord shall be marked with 2 marks so that a distance of 10 inches is between gage marks. The specimen shall then be exposed in a cold chamber to a temperature of $-40^{\circ}\text{F.} + 5^{\circ}\text{F.}$ for two hours. At the end of the exposure period, the specimen shall be tested in the cold chamber at that temperature for elongation in accordance with 4.3.1 under an elongation load of two pounds.

4.3.4 Picks per inch.- Picks per inch shall be counted visually with the cord so positioned that the repeat of the stitch pattern creates a straight line parallel to the axis of the cord.

4.3.5 Weight.- A 48-inch test specimen of cord shall be suspended in such a manner as to allow a 2-ounce weight to be hung on the lower end and without obstruction. After one minute, two marks shall be made on the cord a distance of 36 inches apart. Release the tension, cut the specimen at the 36-inch gage marks and weigh to the nearest 0.01 ounce.

4.3.6 Color (shade) matching.- The dyed cord shall match the standard sample under natural (north sky) daylight or artificial daylight having a color temperature of $7500^{\circ}\text{Kelvin}$ and shall be a good approximation to the standard sample under incandescent lamplight of $2800^{\circ}\text{Kelvin}$.

4.3.7 Gage of rubber.- The gage of rubber shall be determined by counting the actual number of strands, laid side by side, contained in one inch. The gage is equivalent to the actual number of rubber yarns contained in one inch. A measuring device which measures the gage of rubber yarns may be utilized providing results are comparable.

5. PREPARATION FOR DELIVERY

5.1 Packaging.- Packaging shall be level A or C as specified (see 6.2).

5.1.1 Level A and C.- The cord shall be packaged in accordance with the applicable requirements of MIL-C-3131.

5.2 Packing.- Packing shall be level A, B and C as specified (see 6.2).

5.2.1 Levels A, B, and C.- The cord shall be packed in accordance with the applicable requirements of MIL-C-3131.

5.3 Marking.- In addition to any special markings required by the contract or order, interior packages and shipping container shall be marked in accordance with MIL-C-3131.

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6. NOTES

6.1. Intended use.- The elastic cord covered by this specification is used as a draw cord in the man's field coat, vesicant gas protective coat, cold weather overalls for mechanics, traffic-control ensemble, man's parka, rucksack cover, and fragmentation protective body armor.

6.2 Ordering data.- Procurement documents should specify the following:

- a. Title, number and date of this specification.
- b. Class required (see 1.2).
- c. Color required (see 3.4).
- d. When put-up other than specified is required (see 3.7).
- e. Selection of applicable levels of packing and packaging (see 5.1 and 5.2).

6.3 Standard sample.- For access to standard sample, address the procuring office issuing the invitation for bids.

6.4 Marginal notations.- The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and suppliers are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodians:

Army - GL
Navy - SA

Preparing activity:

Army - GL

Project No. 8305-0842

Review activity:

Army - MD

User activities:

Navy - OS, MC

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SPECIFICATION ANALYSIS SHEET		Form Approved Budget Bureau No. 22-R255
<p>INSTRUCTIONS: This sheet is to be filled out by personnel, either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments and suggestions submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or serve to amend contractual requirements.</p>		
SPECIFICATION Cord, Elastic Cotton		MIL-C-43303B
ORGANIZATION		
CITY AND STATE		CONTRACT NUMBER
MATERIAL PROCURED UNDER A <input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> SUBCONTRACT		
1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? A. GIVE PARAGRAPH NUMBER AND WORDING.		
B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES		
2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID		
3. IS THE SPECIFICATION RESTRICTIVE? <input type="checkbox"/> YES <input type="checkbox"/> NO (If "yes", in what way?)		
4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)		
SUBMITTED BY (Printed or typed name and activity - Optional)		DATE

DD FORM 1426
1 JAN 66

REPLACES EDITION OF 1 OCT 64 WHICH MAY BE USED.