MIL-C-40088A (AR)
15 August 1977
SUPERSEDES
MIL-C-40088 (ORD)
9 December 1959

MILITARY SPECIFICATION

CORD, ACRYLIC, LACING

This specification approved for use by the U.S. Army Armament Research and Development Command, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 This specification covers acrylic lacing cord for use in the assembly of propelling charges.

1.2 Classification. Acrylic lacing cord shall be of the following types and classes, as specified (see 6.2):

Type I - Three cords, each cords containing not less than three single ends
Class 1 - 20 pound strength, minimum
Class 2 - 30 pound strength, minimum
Class 3 - 85 pound strength, minimum
Class 4 - 100 pound strength, minimum
Type II - Braided round without interior axial core
Class 1 - 20 pound strength, minimum
Class 2 - 30 pound strength, minimum
Class 3 - 85 pound strength, minimum

2. APPLICABLE DOCUMENTS

2.1 Issue of documents. The following documents of the issue in effect on date of invitiation for bids or request for proposal form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

PPP-B-585 - Boxes; Wood, Wirebound
PPP-B-601 - Boxes; Wood, Cleated-Plywood
PPP-B-621 - Boxes; Wood, Nailed and Lock-Corner
PPP-B-636 - Boxes, Fiber

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 Command, Attn. DRDAR-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.

FSC: 4020

MILITARY

MIL-L-10547 - Liners, Case, Waterproof
MIL-A-48078 - Ammunition, Standard Quality Assurance Provisions, General Specification for

STANDARDS

FEDERAL

FED Test Method Std. No. 191 - Textile Test Methods

STANDARDS

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129 - Marking for Shipment and Storage

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

3. REQUIREMENTS

3.1 Material. Acrylic lacing cord shall be manufactured from yarn of acrylic fibers. An acrylic fiber is defined as one that is spun from a polymer containing at least 85 percent acrylonitrile.

3.1.1 Yarn. The acrylic yarn shall be of such size and twist as to meet the requirements of this specification.

3.1.2 Chemical requirements.

3.1.2.1 Color. Unless otherwise specified in the contract or order the color of the cord shall be natural. If color is specified (see 6.2), the color shall be obtained by "dope" dyeing (the color being added to the acrylic polymer mix prior to spinning the filaments) or conventional dyeing as specified by the contracting officer (see 6.3 and 4.4.2.1.).

3.1.2.2 Chemical. The chemical requirements shall be in accordance with Table I when tested as specifed.

Chemical Requirements
Table I

Properties	Percent	Test
Ash, Max.	1.0	4.5.
Halogens	NONE	4.5.2
Acrylic fiber, Min.	99..0	4.5.3

3.1.2.3 Physical requirements. The physical requirements shall be in accordance with Table II when tested as specified.

Physical Requirements
Table II

Properties	Class 1	2	3	4	Test
Breaking strength pounds, min.	20	30	85	100	4.5.4
Yards per pound	1600±120	850±6	270±20	240 min.	4.4.2.2

3.2 Knots. Breaks in ends or plies shall be joined by knots. A full knot is defined as a knot in the entire cord. The average number of full knots shall be not more than 1 for every 2 ounces of cord (see 4.4.2.2).

3.3 Put up. Unless otherwise specified, the lacing cord shall be supplied on commerical cones or tubes (see 6.2) each containing a minimum of 500 yards and weighing 1 to 2 pounds (see 4.4.2.2).

3.4 Winding. The lacing cord shall be firmly and evenly wound so as not to affect free, unhampered unwinding of the cord. The cord shall contain no kinks or entanglements (see 4.4.2.2).

3.5 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.

3.6 Workmanship. The finished cord shall be clean, uniform in color, and shall conform to the quality and grade of product established by this specification. The occurrence of defects shall not exceed that set by the applicable quality levels (see 4.4.2.2).

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 inspections 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) units of cord on holders.

4.3.2 Inspection to be performed. The sample will be subjected by the Government to any or all of the examinations or tests specified in 4.5 of this specification.

4.3.3 Rejection. See MIL-A-48078.

4.4 Quality conformance inspection

4.4.1 Inspection lot formation. Inspection lots shall comply with lot formation provisions of MIL-A-48078. In addition, inspection lots of acrylic cord shall contain cord from not more than one lot from one manufacturer.

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).

CLASSIFICATION OF DEFECTS & TESTS

PARAGRAPH	TITLE		SHEET 1 OF 1		DRAWING NUMBER
4.4.2.1	Cord, on Holders				NA
					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.	Identification label missing, incorrect, incomplete, illegible or insecurely attached		0.40%	5.2	Visual/Manual
102.	Loose ply		0.40%	3.4	Visual/Manual
103.	Cut, tear, chafe or slip		0.40%	3.6	Visual
Minor					
201.	Color uneven or other than specified		0.65%	3.6	Visual
202.	Dirt, spot or stain clearly noticeable		0.65%	3.6	Visual
203.	Finish uneven, lumpy, bare of thin spots or other than specified		0.65%	3.6	Visual

NOTES:

SARPA-QA FORM 2567 FEB 74

PARAGRAPH	TITLE		SHEET 1 OF 1		DRAWING NUMBER
4.4.2.2	Cord, as unwound from holder				NA
					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.	Cord, not in continuous lengths		0.40%	3.4	Visual
102.	Incorrect construction (3 cords)		0.40%	3.6	Visual
103.	Average of more than one cord knot per two ounces		0.40%	3.2	Visual/Scale
104.	Cord, improperly or not firmly wound		0.40%	3.4	Visual/Manual
105.	Strands adhere to each other or holder		0.40%	3.4	Manual
106.	Cord not free from entanglement		0.40%	3.4	Manual
107.	Yardage less than 500 per cone or tube		0.40%	3.3	Count
Minor					
201.	Evidence of poor workmanship		0.65%	3.6	Visual

NOTES:

SARPA-QA FORM 2567 FEB 74

CLASSIFICATION OF DEFECTS & TESTS MIL-C-40088A(AR)

PARAGRAPH	TITLE		SHEET 1 OF 1		DRAWING NUMBER
4.4.2.3	Holder				NA
					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.	Incorrect average weight per holder		0.40%	3.3	Balance or Scale

NOTES:

SARPA-QA FORM 2567 FEB 74

4.4.3 Testing

4.4.3.1 For examination of packaging, packing and marking. A random sample of filled containers shall be selected for examination in accordance with Standard MIL-STD-105. The unit-of-product shall be one container. Unless otherwise specified the inspection level shall be S-4, table I of Standard MIL-STD-105.

4.4.3.2 For tests. A random sample of cones or tubes shall be selected for tests in accordance with Standard MIL-STD-105. The unit-of-product shall be one cone or tube. Unless otherwise specified the inspection level shall be S-1, table I of Standard MIL-STD-105.

Table III

Inspection Requirement	Defect Classification	Test Paragraph
Ash	Major	4.5.1
Halogen	Major	4.5.2
Acrylic fiber	Major	4.5.3
Breaking strength	Major	4.5.4
Yards per pounds	Major	4.4.2.2
Knots	Major	4.4.2.2
Put up	Major	4.4.2.2
Winding	Major	4.4.2.2
Workmanship	Minor	4.4.2.2

4.5 Test methods

4.5.1 Ash. Pieces shall be cut from each of the tubes comprising the sample so as to obtain a total of 2 grams. These pieces shall be transferred to a tared porcelain crucible. The crucible shall be heated carefully over a flame so as to avoid any mechanical loss. When the contents of the crucible have been charred, they shall be heated to dull redness until all carbonaceous matter has been burned off. The crucible shall be cooled in a desiccator and weighed. The percent of ash in the sample shall be calculated as follows:

$$\text{Percent ash} = \frac{100\ (A-B)}{W}$$

Where:

A = Weight of crucible and ignited residue
B = Weight of crucible empty
W = Weight of sample

4.5.2 Halogens. A copper wire shall be heated in a Bunsen flame until all green coloration disappears. The wire shall be removed from the flame, and strands of yarn

taken from the cord shall be wound around the hot end of the wire and again the wire shall be introduced into the flame. The presence of green coloration in the flame which persists for more than 3 seconds indicates the presence of halogens in the cord.

4.5.3 Acrylic fiber content. Weigh accurately approximately 5 grams of the sample and transfer to a 600-ml. beaker and then add 200 ml. of 70 percent aqueous ammonium thiocyanate to the beaker. Heat the beaker and contents and allow to boil gently for 10 minutes. If there is no fibrous material remaining, the test may be discontinued and the acrylic fiber content of the specimen reported as 100 percent. However, if a fibrous residue remains, it shall be thoroughly washed with distilled water, transferred to a tared, 250-ml. beaker, dried in an oven maintained at 103°C + 2°C for one hour, cooled in a desiccator and then weighed. The acrylic fiber content shall be calculated as follows:

$$\text{Percent acrylic fiber} = \frac{(A-B)\ 100}{A}$$

where:

A = weight of specimen
B = weight of residue after extraction with 70 percent ammonium thiocyanate

4.5.4 Breaking strength. The breaking strength shall be determined as specified in method 4102 of Specification FED-STD-191.

5. PREPARATION FOR DELIVERY

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

5.1.1 Level A. The cord shall be wound on cones or tubes (see 3.3 and 6.2). The cones shall be individually wrapped in tissue paper or other suitable cellulose sheeting.

5.1.2 Level C. The cord shall be packaged in accordance with supplier's best commercial practice. Protection shall be such as to prevent deterioration during shipment and subsequent interval preliminary to use.

5.1.3 Intermediate packaging. When intermediate packaging is required (see 6.2) unit packages shall be intermediately packaged in containers conforming to Specification PPP-B-636 class 1. The gross weight shall not exceed 20 pounds. Container closure shall be made in accordance with the applicable specificaiton.

5.2 Packing. Packing shall be level A or C as specified (see 6.2).

5.2.1 Level A. The packages containing the cord shall be packed in cleated plywood boxes, nailed wood boxes, or wirebound wood boxes conforming to the requirements of Specification PPP-B-601 (overseas type), PPP-B-621 (class 2) or PPP-B-585 (class 3) respectively. Shipping containers shall be lined with a sealed waterproof case liner complying with Specification MIL-L-10547, or its equivalent. Containers shall be strapped in accordance with the strapping requirements of the appendix of the applicable box specification. The gross weight shall not exceed 200 pounds.

5.2.2 Level C. Packing shall be in accordance with commercial practice adequate to ensure acceptance and safe delivery by the carrier for the mode of transportation employed.

5.3 Marking. Interior packages and exterior containers shall be marked in accordance with Standard MIL-STD-129.

6. NOTES

6.1 Intended use. The cord covered by this specification is intended for assemlby of propelling charges.

6.2 Ordering data. See MIL-A-48078. Procurement documents should specify the following:

(a) Type required (see 1.2)
(b) Yards required
(c) Whether first article sample is required (see 3.5)
(d) Color if required (see 3.1.2.1)
(e) Whether cord is to be supplied on cones or tubes (see 3.3)
(f) Put up if other than that specified (see 3.3)
(g) Selection of applicable levels of packaging and packing (see 5.1 and 5.2)
(h) Whether intermediate packaging is required (see 5.1.3).

6.3 Colorant. Although the type of colorant is not specified, consideration in selecting the colorant should be given to the ash content (see 3.1.2.2).

6.4 Submission of inspection equipment designs for approval. See MIL-A-48078. Submit equipment designs, as required, to Commander, U.S. Army Armament Research and Development Command, ATTN: DRDAR-QA, Dover, New Jersey 07801.

6.5 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 Office to: Commander, U.S. Army Armament Research and Development Command, ATTN: DRDAR-QA, Dover, New Jersey 07801. This description should include but not be limited to the procedures used, the accuracy and precision of the method, test data to demonstrate the accuracy and precision and drawings of any special equipment required.

Custodian:
Army-AR

Preparing Activity:
Army-AR

Project Number: 4020-A008

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

OMB Approval
No. 22-R255

INSTRUCTIONS: The purpose of this form is to solicit beneficial comments which will help achieve procurement of suitable products at reasonable cost and minimum delay, or will otherwise enhance use of the document. DoD contractors, government activities, or manufacturers/vendors who are prospective suppliers of the product are invited to submit comments to the government. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements. Attach any pertinent data which may be of use in improving this document. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity.

DOCUMENT IDENTIFIER AND TITLE

NAME OF ORGANIZATION AND ADDRESS

CONTRACT NUMBER

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY DOCUMENT REQUIREMENT CONSIDERED TOO RIGID

3. IS THE DOCUMENT RESTRICTIVE?

☐ YES ☐ NO *(If "Yes", in what way?)*

4. REMARKS

SUBMITTED BY *(Printed or typed name and address - Optional)*

TELEPHONE NO.

DATE

DD FORM 1 JAN 72 1426

REPLACES EDITION OF 1 JAN 66 WHICH MAY BE USED