MIL-C-498E
27 March 1987
SUPERSEDING
MIL-C-498D
23 June 1982

MILITARY SPECIFICATION

# CLOTH, PARACHUTE, SYNTHETIC-FIBER (FOR AMMUNITION PARACHUTES)

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

## 1. SCOPE

* 1.1 Scope. This document covers three types of nylon cloth, for the fabrication of ammunition and flare parachutes.

* 1.2 Classification. The cloth shall be of the following types (see 6.2):

Type D - Nylon (0.88 oz per sq yd)
Type G - Nylon (0.88 oz per sq yd) (ordnance)
Type H - Nylon (2.20 oz per sq yd)

## 2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Documents. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATION

FEDERAL

PPP-P-1133 - Packaging of Synthetic Fiber Fabrics

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: U.S. Army Natick Research, Development, and Engineering Center, Natick, MA 01760-5014, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 8305

STANDARDS

FEDERAL

FED-STD-191 - Textile Test Methods

MILITARY

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

(Copies of documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.1.2 Other Government documents. The following other Government documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

Rules and Regulations Under the Textile Fiber Products Identification Act

(Application for copies should be addressed to the Federal Trade Commission, Pennsylvania Avenue at Sixth Street, N.W., Washington, DC 20580.)

* 2.2 Other publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issues of the nongovernment documents which are current on the date of the solicitation.

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

AATCC Chromatic Transference Scale

(Application for copies should be addressed to the American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709.)

(Technical society and technical association documents are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document shall take precedence. Nothing in this document, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Material. (See 6.4.)

3.1.1 Fiber. The nylon yarn used in the manufacture of the cloth shall be a polyamide prepared from hexamethylene diamine and adipic acid or its derivatives and shall have a minimum melting point of 254°C ± 10°C when tested as specified in 4.2.3.

* 3.1.2 Yarn. The warp and filling yarns for types D and G shall be 30 denier (nominal) multifilament. The warp and filling yarns for type H shall be 70 denier (nominal) multifilament when tested as specified in 4.2.3.

3.1.3 Color. The color of the cloth shall be as specified (see 6.2) and shall match the standard sample (see 6.3).

* 3.1.4 Matching. The color of the finished cloth shall match the standard sample when viewed under filtered tungsten lamps that approximate artificial daylight and that have a correlated color temperature of 7500 ± 200 K, with illumination of 100 ± 20 foot candles, and shall be a good match to the standard sample under incandescent lamplight at 2300 ± 200 K.

* 3.1.5 Colorfastness. The color of the finished cloth shall show colorfastness to crocking and water equal to or better than the standard sample. When no standard sample has been established or designated as applicable to colorfastness, the color of the finished cloth shall show "good" colorfastness to water and shall show an AATCC Chromatic Transference Scale rating for crocking not lower than 3.5 when tested as specified in 4.2.3.

* 3.2 Physical requirements. The physical requirements of the finished cloth shall be as specified in table I when tested as specified in 4.2.3.

TABLE I. Physical requirements

| Characteristic | Type D | Type G 1/ | Type H |
|---|---|---|---|
| Weight (ounce per sq yd), max | 0.88 | 0.88 | 2.20 |
| Breaking strength (pounds), min | | | |
| Warp | 40 | 40 | 65 |
| Filling | 40 | 40 | 65 |
| Tearing strength (pounds), min | | | |
| Warp | 2.5 | 2.5 | 5.0 |
| Filling | 2.5 | 2.5 | 4.0 |
| Elongation (percent), min | | | |
| Warp | 20 | 20 | - |
| Filling | 20 | 20 | - |
| Air permeability (CFM of air per square ft of cloth) | 300 to 500 1/ | 200 to 325 | 40 to 80 |
| Yarns per inch | | | |
| Warp | 93 ± 3 | 93 ± 3 | 104 (min) |
| Filling | 93 ± 3 | 93 ± 3 | 91 (min) |

1/ For signal parachute ordnance Part No. 8797994 and other applications as may be specified by the responsible authority.

3.2.1 Weave. The weave shall be plain.

* 3.2.2 Width. The width of the cloth shall be as specified (see 6.2) and shall be the minimum acceptable width inclusive of the selvage when fly-shuttle looms or shuttleless with tuck-in selvage are used. For all other shuttleless looms, the width measurement shall be made between the last warp yarn on each side excluding the protruding fringe(s).

3.3 Finish. The cloth shall be scoured to remove sizing and other contaminants. The cloth shall be heat treated and may be calendered at such temperature and pressure as required to control the air permeability to the level required by this document.

3.3.1 pH. The pH of the water extract of the finished cloth shall be not lower than 5.0 and not higher than 8.5 when tested as specified in 4.2.3.

3.3.2 Total nonfibrous. The total sizing, finishing, and other nonfibrous material content of the finished cloth shall not exceed 1.0 percent when tested as specified in 4.2.3.

3.4 Length and put-up. The cloth shall be put up in full width rolls as specified in 5.1, and no roll shall contain more than 3 pieces.

* 3.4.1 Types D, G, and H. Unless otherwise specified (see 6.2), the length of each piece of types D, G, and H cloth shall be not less than 75 yards.

3.5 Fiber identification. Each roll of cloth shall be labeled or ticketed for fiber content in accordance with the Textile Fiber Products Identification Act.

3.6 Workmanship. The finished cloth shall conform to the quality of product established by this document. The occurrence of defects shall not exceed the applicable quality levels.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor 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 this document where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

* 4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this document shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirement in the document shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.1.2 Certificates of compliance. When certificates of compliance are submitted, the Government reserves the right to inspect such items to determine the validity of the certification.

4.2 Quality conformance inspection. Unless otherwise specified, sampling for inspection shall be performed in accordance with MIL-STD-105.

4.2.1 Component and material inspection. In accordance with 4.1, components and materials shall be inspected in accordance with all the requirements of referenced documents unless otherwise excluded, amended, modified, or qualified in this document or applicable purchase document.

4.2.2 End item examination.

4.2.2.1 Yard-by-yard examination. The required yardage of each roll shall be examined, and the defects clearly noticeable at normal inspection distance (3 feet), shall be counted regardless of their proximity to each other. A continuous defect shall be counted as one defect for each warpwise yard or fraction thereof in which it occurs. The lot size shall be expressed in units of yards. The sample unit shall be 1 linear yard. The inspection level shall be II and the acceptable quality level (AQL), expressed in terms of defects per hundred units, shall be 4.0. The number of rolls from which the sample is to be selected shall be in accordance with table II. An approximately equal number of yards shall be examined from each roll sampled.

| Defect | Description |
|---|---|
| Multiple floats | Three or more, extending 1/2 inch or more in length. |
| Hole, cut, or tear | 1/4 inch or more. |
| Broken or missing yarn | Three or more contiguous, 6 inches or more in length. |
| Spot, stain, or streak | Exceeding 3 square inches in area. |
| Open place | Stripe of no filling exceeding 1/4 inch in width. |
| Width | Less than specified. |

4.2.2.2 Examination for labeling of rolls. During the yard-by-yard examination, each roll in the sample shall be examined for compliance with the Textile Fiber Products Identification Act. The lot shall be unacceptable if two or more rolls in the sample are not labeled or ticketed in accordance with the Rules and Regulations Under the Textile Fiber Products Identification Act.

* 4.2.2.3 Length examination. Each roll of cloth used in the yard-by-yard examination shall be examined for the defects listed below. If the total number of defects in the sample rolls exceeds the applicable acceptable number specified in table II or if the total of the actual lengths of the sample rolls is less than the total of the lengths marked on the roll tickets, the lot shall be rejected.

Defects

Any gross length less than the specified minimum length
Any gross length more than 2 yards less than the gross length marked on the roll ticket.
Any roll containing more than the specified maximum number of pieces

TABLE II. Lot size and acceptance criteria

| Lot size (yards) | Lot size (rolls) | Acceptance number 1/ |
|---|---|---|
| 3,200 or less | 2 | 0 |
| 3,201 up to and including 10,000 | 3 | 0 |
| 10,001 up to and including 60,000 | 5 | 0 |
| 60,001 up to and including 150,000 | 8 | 1 |
| 150,001 and over | 13 | 1 |

1/ Applicable to length examination only (see 4.2.2.3).

4.2.2.4 Examination for shade. During the yard-by-yard examination, each roll in the sample shall be examined for shade. Any roll in the sample off shade or shaded side to side, side to center, or end to end shall be cause for rejection of the lot.

* 4.2.3 End item testing. The methods of testing specified in FED-STD-191, wherever applicable, and as listed in table III 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. All test reports shall contain the individual values utilized in expressing the final result. The lot size shall be expressed in units of yards. The sample unit shall be 2 1/2 continuous yards (full width)

of the finished cloth. The lot shall be unacceptable if one or more sample units fail to meet any test requirements specified. The number of sample units shall be as follows:

| Lot size (yards) | Sample size (sample units) |
|---|---|
| 800 or less | 2 |
| | 3 |
| 22,001 and over | 5 |

TABLE III. End item tests

| Characteristics | Requirement paragraph | Test method |
|---|---|---|
| Material | | |
| Fiber (nylon) | 3.1.1 | 1530 1/ |
| Melting point | 3.1.1 | 1534 |
| Yarn | 3.1.2 | 1/ |
| Colorfastness to: | | |
| Crocking | 3.1.5 | 5651 |
| Water | 3.1.5 | 5630 |
| Weight | 3.2 | 5041 2/ |
| Breaking strength | 3.2 | 5100 |
| Tearing strength | 3.2 | 5134 |
| Elongation (Types D and G only) | 3.2 | 5100 |
| Air permeability | 3.2 | 5450 |
| Yarns per inch | 3.2 | 5050 |

TABLE III. End item tests - Continued

| Characteristics | Requirement paragraph | Test method |
|---|---|---|
| Weave | 3.2.1 | 1/ |
| pH | 3.3.1 | 2811 |
| Total nonfibrous material (percent) | 3.3.2 | 2611 |

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

2/ Except that the results shall be reported to the nearest 0.01 ounce per square yard.

4.2.4 Packaging inspection. The inspection shall be in accordance with the quality assurance provisions of PPP-P-1133.

5. PACKAGING

5.1 Put-up and preservation. Put-up and preservation shall be level A or Commercial, as specified (see 6.2).

* 5.1.1 Levels A and Commercial. The cloth shall be put-up and preserved in accordance with the applicable requirements of PPP-P-1133.

5.2 Packing. Packing shall be level A, B, or Commercial, as specified (see 6.2).

* 5.2.1 Levels A, B, and Commercial. The cloth shall be packed in accordance with the applicable requirements of PPP-P-1133.

5.3 Marking. In addition to any special marking required in the contract or purchase order, shipments shall be marked in accordance with the requirements of PPP-P-1133.

6. NOTES

6.1 Intended use. The cloth is intended for use in the manufacture of ammunition and flare parachutes.

6.2 Ordering data. Acquisition documents should specify the following:

a. Title, number, and date of this document.
b. Type required (see 1.2).
c. Color required (see 3.1.3).
d. Width of cloth (see 3.2.2).
e. Minimum piece length if other than specified (see 3.4.1).
f. Selection of applicable levels of put-up, preservation, and packing (see 5.1 and 5.2).

6.3 Standard sample. For access to samples, address the contracting activity issuing the invitation for bids.

6.4 Recycled material. It is encouraged that recycled material be used when practical as long as it meets the requirements of this document (see 3.1).

6.5 Obtaining consistent air permeability requirements for Type H nylon. It has been found that the yarn twist is important in obtaining consistent and conforming air permeability requirements of Type H.

* 6.6 Subject term (key word) listing.

Ammunition
Cloth, parachute
Flare
Parachute, ammunition and flare

6.7 Changes from previous issue. The margins of this document 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 contractors are cautioned to evaluate the requirements of this document based on the entire content, as written, irrespective of the marginal notations and relationship to the last previous issue.

Custodians:

Army - GL
Navy - AS

Review activities:

Army - MD
DLA - CT

Preparing activity:

Army - GL

Project No. 8305-0116

# STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

*(See Instructions – Reverse Side)*

| 1. DOCUMENT NUMBER | 2. DOCUMENT TITLE |
|---|---|
| MIL-C-498E | Cloth, Parachute, Synthetic-Fiber (For Ammunition Parachutes) |

| 3a. NAME OF SUBMITTING ORGANIZATION | 4. TYPE OF ORGANIZATION *(Mark one)* |
|---|---|
| | ☐ VENDOR |
| b. ADDRESS *(Street, City, State, ZIP Code)* | ☐ 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)* |

DD FORM 82 MAR 1426 PREVIOUS EDITION IS OBSOLETE.

NATICK OP, 1 Apr 84