

MIL-C-19377C
~~7 January 1981~~
SUPERSEDING
MIL-C-19377B (NAVY)
2 December 1968

MILITARY SPECIFICATION

CLOTH, TWILL, NYLON

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

1. SCOPE

1.1 Scope This specification covers the requirements for one type of a 3.0 ounce nylon twill cloth that is to be coated and used for inflatable sea survival equipment

2. APPLICABLE DOCUMENTS

2.1 Issues of documents. 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

PPP P-1133 -Packaging and Packing of Synthetic Fiber Fabrics

STANDARDS

FEDERAL

FED-S1D-191 -Textile Test Methods

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to. Engineering Specifications and Standards Department (Code 93), Naval Air Engineering Center, Lakehurst, NJ 08733, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

NO INFORMATION REQUIREMENTS

FSC 8305

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MIL-STD-105

-Sampling Procedures and Tables for
Inspection by Attributes

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

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

COLOR ASSOCIATION OF THE UNITED STATES, INC.

TCA Cable Numbers and Colors

(Application for copies should be addressed to the Color Association of the United States, Inc., 200 Madison Avenue, New York, NY 10016.)

RULES AND REGULATIONS UNDER THE TEXTILE FIBER PRODUCTS IDENTIFICATION ACT

(Application for copies should be addressed to the Federal Trade Commission, Washington, DC 20580.)

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

3. REQUIREMENTS

3.1 First article. When specified (see 6.2), the contractor shall furnish one sample unit for first article inspection and approval (see 4.3 and 6.3).

3.2 Materials. The nylon yarn used in the manufacture of the cloth shall be a bright, high tenacity, polyamide prepared from hexamethylene diamine and adipic acid or its derivatives. It shall have a minimum melting point of 245°C (473°F). The yarn shall be first quality and knot free. The warp yarn shall be 70 denier with 34 filaments and approximately 7 turns per inch. The filling yarn shall be 100 denier with 34 filaments and approximately 5 turns per inch. The yarn shall not be bleached in any manner or in any subsequent process.

3.2.1 Warp preparation. During the preparation of the warp, including tying-in on the loom, care should be taken not to abrade the yarns in order to prevent breaking of filaments or yarns during weaving. Smooth eyelets and burnished heddles should be used.

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3.3 Cloth properties. The finished cloth shall conform to the requirements specified in table I when tested as specified in 4.6 and 4.6.1.

3.4 Color. Unless otherwise specified by the acquiring activity, the cloth color shall match one of the following colors. Chrome or metalized dyes that enhance flammability, or dye-stuffs that accelerate sunlight-deterioration, shall not be used.

List of colors

<u>TCA cable number</u>	<u>Color</u>
15405	Smoke green (U.S. Air Force sage green)
67006	Blue
67007	Orange
70072	Indian orange

(The crepe side of the TCA color standards shall be used for color matching.)

Scarlet-Munsell 8.5 red 5/14.5 (Naval Ship Engineering Center designation for the orange color is sea rescue orange).

(This color standard may be obtained from the Chemical Laboratory, Norfolk Naval Shipyard, Portsmouth, VA 23709.)

Number 23 (lusterless), U.S. Marine Corps standard green color.

(This color standard may be obtained from the Commanding General, Marine Corps Logistics Base (Attn: Code P822), Albany, GA 31704.)

3.5 Finish. The cloth may be calendered and shall have a natural finish.

3.5.1 Non-fibrous material. The total chloroform-soluble and water-soluble material content of the finished cloth shall not exceed 1.0 percent when tested as specified in table V.

3.5.2 Copper and manganese content. The cloth shall contain not more than 0.01 percent copper or more than 0.001 percent manganese when tested as specified in table V.

3.6 Heat setting. The cloth shall be uniformly heat set. The cloth shall show no appreciable distortion or puckering when tested as specified in 4.6.2.

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3.7 Dimensions.

3.7.1 Width. The width shall be as specified by the acquiring activity

3.7.2 Length Unless otherwise specified, the cloth shall be in one continuous piece of not less than 40 yards in length. Each length shall be put up on rolls as specified in PPP-P-1133.

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

3.9 Age. The yarn shall be not more than 3 years old from the date of manufacture to the date of manufacture of cloth.

3.10 Workmanship. The finished cloth shall conform to the quality and grade of product established by this specification. The occurrence of defects shall not exceed the acceptable quality levels specified herein.

4 QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, 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 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 Classification of inspection. The inspection requirements specified herein are classified as follows:

- 1 First article inspection (see 4.3).
- 2 Quality conformance inspection (see 4.4)

4.2.1 Inspection conditions. Unless otherwise specified, all testing shall be performed in accordance with the test conditions specified in FED-STD-191

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4.3 First article inspection When required (see 6.2), the first article sample submitted in accordance with 3.1 shall be visually inspected for appearance, color and finish, and shall be examined and tested as specified in 4.4.1 and 4.6. A sample consisting of 3 yards (full width) shall be submitted for the examination and tests.

4.4 Quality conformance inspection. The quality conformance inspection shall consist of the examinations in 4.4.1 through 4.5 and the tests specified in table V.

4.4.1 Examination of the end item. Examination of the end item shall be in accordance with 4.4.1.1 through 4.4.1.4.

4.4.1.1 Yard-by-yard examination. The required yardage of each roll shall be examined on one side only. The side examined, however, shall be alternated so that the alternate rolls are examined on the face and back respectively. The cloth shall be run over a bank of lights having sufficient intensity to show defects at a normal inspection distance of 2 feet. Each sample unit shall be examined for the defects listed in table II. All defects found shall be counted regardless of their proximity to each other, except where two or more defects represent a single localized condition of the cloth, in which case, only the more serious defect shall be counted. A continuous defect shall be counted as one defect for each warp (lengthwise) yard or fraction thereof in which it occurs. The sample unit for this examination shall be one linear yard. The lot size shall be expressed in units of one linear yard each. The sample size for this examination shall be based on inspection level II and the acceptable quality level (AQL) shall be 2.5 major and 5.0 total defects per 100 units (yards). The number of rolls, from which the sample is to be selected, shall be in accordance with table IV. An approximate equal number of yards shall be examined in each roll of the sample.

4.4.1.2 Overall examination. Each roll in the sample shall be examined for the defects listed in table III. The sample unit shall be one roll. The sample size (number of rolls selected as sample) shall be as shown in table IV. The sample for the overall examination may be selected from the rolls used for the yard-by-yard examination. One or more defects in any roll shall be cause for rejection of the lot represented by the sample.

4.4.1.3 Examination for length.

4.4.1.3.1 Individual rolls. During the yard-by-yard examination, each roll in the sample shall be examined for length. Any length found to be less than the minimum specified or more than two yards less than the length marked on the ticket shall be considered a defect with respect to length. It shall also be a defect if the number of pieces in any roll exceed that specified. The lot shall be unacceptable if one or more rolls in the sample are defective in respect to length.

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4.4.1.3.2 Total yardage in sample The lot shall be unacceptable if the total actual gross length of rolls in the sample is less than the total of the gross length marked on the tickets.

4.4.1.4 Examination for compliance with the Rules and Regulations under the Textile Fiber Products Identification Act. During the yard-by-yard examination, each roll in the sample shall be examined for conformance to the Rules and Regulations under the Textile Fiber Products Identification Act. Each roll not labeled in accordance with this Act shall be a defect. The lot shall be unacceptable if two or more of these defects occur.

4.5 Examination of packaging requirements. An examination shall be made in accordance with the provisions of PPP-P-1133 to determine that packaging, packing and marking comply with section 5 requirements of this specification.

4.6 Testing of the end item. The methods of testing specified in FED-STD-191, whenever 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. All test reports shall contain the individual values utilized in expressing the final result. The sample unit for testing shall be 3-1/2 yards (full width) of the finished cloth. The lot size shall be expressed in units of one yard each. The lot shall be unacceptable if one or more units fail to meet any test requirements specified. The sample size (number of sample units to be tested) shall be in accordance with the following:

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

4.6.1 Shrinkage After conditioning for not less than 4 hours, an 18 in. square shall be marked on a 20 in. square specimen of the cloth by means of a template, using indelible ink. A metal tub of adequate size to accommodate the specimen prepared as described below shall be filled to within 3 in. of the top with water, which shall then be heated to a boil. The specimen shall be placed in the boiling water in a "skein" form prepared by stapling two opposite sides of the specimen together to form a loop or "skein". This shall then be placed over a glass rod 1/4 in. in diameter and 21 in. in length. A glass rod 1/4 in. in diameter and 21 in. long weighing approximately 100 grams, or of sufficient weight to hold the specimen in place in bath, shall be placed inside the loop at the bottom. The loop shall then be suspended in the boiling water bath by attaching it to another

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glass rod 24 in. long and 1/4 in. in diameter by means of twine or wire. The 24 in. glass rod shall rest on the top of the tub allowing the specimen to hang freely in the bath. The specimen shall be subjected to the action of the boiling water bath for a period of 15 minutes. The specimen shall then be removed from the tub and placed flat on a horizontal screen to dry. After the specimen is thoroughly dry, it shall be exposed for at least 4 hours to a standard atmosphere of 65 percent relative humidity and at a temperature of 21°C (70°F). The 18 in. square shall then be measured in three places in the warp direction and three places in the filling direction. The percent shrinkage shall then be calculated.

4.6.2 Heat test. The test specimen shall be a square cloth at least 12 by 12 in. It shall be laid flat without tension, having sides parallel to the warp and filling directions of the fabric. The test specimen shall be placed in an oven maintained at $138 \pm 1^{\circ}\text{C}$ ($280 \pm 2^{\circ}\text{F}$) for a period of two hours. At the end of this period, the specimen shall be removed from the oven, and conditioned under standard atmospheric conditions. The specimens shall be visually compared with the original unheated fabric for the presence of distortion, puckering and fading or change in color.

5. PACKAGING

5.1 Packaging. Packaging shall be level A or C as specified (see 6.2 and 6.2.1).

5.1.1 Levels A and C. The cloth, put up as specified, shall be packaged in accordance with the applicable requirements of PPP-P-1133.

5.2 Packing. Packing shall be level A, B or C as specified (see 6.2 and 6.2.1).

5.2.1 Levels A, B and C. 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 by the contract or order, shipments shall be marked in accordance with the requirements of PPP-P-1133.

6. NOTES

6.1 Intended use. This cloth is intended to be coated for use in the manufacture of inflatable sea survival equipment.

6.2 Ordering data. Acquisition documents should specify the following.

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- a. Title, number and date of this specification.
- b. Color (see 3.4).
- c. Quantity and dimensions of cloth required (see 3.7).
- d. Selection of applicable levels of packaging and packing (see 5.1 and 5.2).
- e. Width tolerance (3 7.1).
- f. First article, if required (see 3.1 and 4.3) and where samples are to be forwarded (see 6.3).

In the preparation of contracts and orders, it must be noted that various options, choices and alternatives as indicated in PPP-P-1133 may be exercised in the packaging and packing of this cloth.

6.3 First article When a first article is required, it shall be tested and approved under the appropriate provisions of 7-104.55 of the Defense Acquisition Regulation (DAR). The first article shall be a preproduction item. The first article should consist of one sample unit. The contracting officer should include specific instructions in all acquisition instruments, regarding arrangements for examinations, tests and approval of the first article

6 4 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

Custodians:
Navy - AS
Air Force - 11

Preparing activity.
Navy - AS
(Project No. 8305-0721)

Review activity
Navy - SH

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TABLE I. Cloth properties.

Characteristics	Requirements
Weave	2/2 right-hand twill
Weight, ounces/sq. yd.	3.0 - 3.3
Yarns per inch, minimum:	
Warp	165
Filling	96
Breaking strength, grab, pounds minimum:	
As received:	
Warp	180
Filling	170
After accelerated weathering, percent loss maximum	40
Tearing strength, tongue, pounds minimum:	
Warp	10.0
Filling	10.0
Shrinkage, percent, maximum:	
Warp	2.0
Filling	2.0
Colorfastness to:	
Laundering	Good
Dry cleaning	Good
Crocking	Munsell value not lower than 8.5
Light	Good
Perspiration	Good
Acidity, pH	5.0 - 8.5

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Table II. List of defects

DEFECTS	MAJOR	MINOR
Filling-wise: Broken or missing picks: Two or more adjacent picks missing or broken One pick missing or broken 3 inches or more	X	X
Double pick or misspick: Clearly visible, heavy pick caused by pick woven in improper place		X
Jerked-in or pulled-in filling: Extra thread lashed into filling Clearly visible, open place or distortion of fabric extending more than 4 inches from edge	X	X
Mixed, uneven or soiled filling; fine or coarse filling: Adjacent filling-wise areas varying visibly in shade		X
Pick-out mark as pressure mark: Clearly visible, pick out or pressure mark resulting in open place or distortion of fabric		X
Slack or tight pick: Clearly visible		X
Warp-wise: Broken or missing end Two or more adjacent ends missing or broken One broken or missing end 3 inches or more	X	X
Slack or tight ends: Clearly visible		X
Reed mark: Clearly visible		X
Floats or skips: 3/8 in. or more in either direction Less than 3/8 in. in either direction	X	X
Fuzz balls or stripbacks <u>1</u>/: Clearly visible		X
Slub, slough-off, bunch, knots, kinks or loops <u>1</u>/: Large, loose and bulky, 3 times or more than normal thickness One or more small and tight	X	X

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TABLE II. List of defects. - continued

DEFECTS	MAJOR	MINOR
Cut, torn, or broken selvages: Extending into body of cloth	X	
Holes, cuts, or tears: Any hole, cut, or tear in the body of cloth	X	
Finishing: Crease or mill wrinkles: Sharp and permanent Multiple soft creases	X	X
Finishing bar: Clearly visible		X
General: Abrasion, chafe, or bruise mark clearly visible		X
Bias or bowed filling 1-1/2 in. or more from straight line of filling	X	
Less than 1-1/2 in. from straight line but more than 1/2 in.		X
Smash: Texture definitely ruptured	X	
Spots, stains, or streaks: Clearly visible		X
Tender or weak spots: Clearly visible	X	

1/ Removal of cloth defect shall not cause puckering.

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TABLE III. Overall defects.

Edges curled, folded, rolled, beaded or slack throughout the roll.
Tight selvage resulting in slackness or waviness of cloth.
Overall uncleanness.
Width less than specified.
Off shade, shaded end to end, side to center, side to side or throughout the roll.
Mottled, cloudy, streaky or poor penetration of dye.

TABLE IV. Sample size.

Lot size in yards	Sample size in rolls
Up to 1200 <u>1/</u>	3
1201 - 3200	5
3201 - 10,000	8
10,001 - 35,000	13
35,001 - 150,000	20
150,001 and over	32

1/ If lot is fewer than three rolls, each roll in the lot shall be examined.

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TABLE V. Test methods.

Characteristics	Requirement paragraph	Test method or paragraph
Melting point	3.2	1534 <u>1/</u>
Denier	3.2	4021 <u>1/</u>
Turns per inch	3.2	Visual
Weave	Table I	Visual
Weight	Table I	5041
Yarns per inch	Table I	5050
Breaking strength, initial	Table I	5100
Breaking strength, after accelerated weathering <u>2/</u>	Table I	5804/5100
Tearing strength	Table I	5134
Shrinkage	Table I	4.6.1
Colorfastness to:		
Laundering	Table I	5614
Dry cleaning	Table I	5620
Crocking	Table I	5650
Light	Table I	5660
Perspiration	Table I	5680
Acidity (pH)	Table I	2811
Non-fibrous material <u>3/</u>	3.5.1	2611
Copper & manganese content	3.5.2	2053
Heat set	3.6	4.6.2
Age	3.9	<u>1/</u>

- 1/ A certificate of compliance shall be submitted and will be acceptable for the stated requirement.
- 2/ Except that the time of exposure shall be 50 hours and the spray heads shall be shut-off.
- 3/ The test shall be limited to chloroform-soluble and water-soluble material (see 3.5.1).

INSTRUCTIONS: In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge (*DO NOT STAPLE*), and mailed. In block 5, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

NOTE This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification requirements on current contracts. 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.

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER

2. DOCUMENT TITLE

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/Retrospective Recommendation

6. REMARKS

7a. NAME OF SUBMITTER (Last, First, MI) - Optional

b. WORK TELEPHONE NUMBER (Area Code) - Optional

c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional

8. DATE OF SUBMISSION (YYMMDD)