

MIL-C-17155G
7 April 1988
SUPERSEDING
MIL-C-17155F
17 July 1979

MILITARY SPECIFICATION

CLOTH, KNITTED, NYLON, FLEECE

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 a knitted nylon fleece fabric.

1.2 Classification. The cloth shall be of the following types, as specified (see 6.2).

Type I - 9.5 to 11.5 oz/yd², Green 3405

Type II - 6.0 to 6.8 oz/yd², Blue 3308

Type III - 9.0 to 10.0 oz/yd², Black 3234

2. APPLICABLE DOCUMENTS

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Officer in Charge, Navy Clothing and Textile Research Facility, 21 Strathmore Road, Natick, MA 01760-2490 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

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* 2.1 Government documents.

* 2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this specification 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.

SPECIFICATIONS

FEDERAL

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

STANDARDS

FEDERAL

FED-STD-191 - Textile Test Methods

MILITARY

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

MIL-STD-1491 - Glossary of Knitting Imperfections

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

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

LAWS AND REGULATIONS

Rules and Regulations Under the Textile Fiber Products Identification Act

(Copies may be obtained from the Federal Trade Commission, Washington, DC 20580.)

* 2.2 Other publications. The following document(s) form a part of this specification 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 issue of the nongovernment documents which is current on the date of the solicitation.

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TECHNICAL MANUAL OF THE AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

Method No. 8 Colorfastness to Crocking: AATCC Crockmeter Method

(Application for copies should be addressed to the AATCC National Headquarters, P.O. Box 12215, Research Triangle Park, NC 27709-9989.)

* 2.3 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. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

* 3.1 Standard sample. The finished cloth shall match the standard 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). The standard sample for type I cloth is identified under piece number 888, the standard sample for type II is piece number 1234, and the standard sample for type III is piece number 78277.

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

3.3 Material.

3.3.1 Fiber. The fiber shall be continuous filament nylon when tested as specified in 4.6.

* 3.3.2 Yarn. The yarn denier for each type shall be as follows when tested as specified in 4.6:

Type	Face	Back
Type I	200 or 210	70
Type II	70	70
(alternate)	100	140
Type III	200	100

* 3.4 Knit. The fabric shall be either a warp or a circular knit when tested as specified in 4.6. The napped side shall be designated as the face of the material. Circular knit shall be slit prior to napping.

* 3.5 Color. The color shall be Green Shade 3405 for type I, Blue Shade 3308 for type II and Black Shade 3234 for type III. Each shall match the standard sample.

* 3.5.1 Matching. The finished cloth shall match the standard sample when viewed under filtered tungsten lamps which approximate artificial daylight having 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.

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* 3.5.2 Colorfastness. The colorfastness of the finished cloth shall be as specified in 3.5.2.1 and 3.5.2.2.

* 3.5.2.1 Colorfastness, Type I and II. The finished cloth shall show colorfastness to laundering (after 3 cycles), wet dry cleaning, perspiration, and crocking equal to or better than the standard sample when tested as specified in 4.6. As a limit of acceptability or when no standard sample is available, the finished cloth shall show a minimum of "good" fastness to laundering, wet dry cleaning, and perspiration, and shall show a wet and dry crocking rating not lower than 3 when tested as specified in 4.6.

* 3.5.2.2 Colorfastness, Type III. The colorfastness for the Type III cloth shall be the same as specified in 3.5.2.1 except that the requirement for laundering (after 3 cycles) is not required.

* 3.6 Finish. The cloth shall be evenly napped to form a non-directional pile on the face equal to or better than the standard sample.

3.7 Physical requirements. The finished cloth shall conform to the physical requirements shown in Table I when tested as specified in 4.6.

TABLE I. Physical requirements

Characteristics	Type I	Type II	Type III
Weight, oz./yd. ² (g/m ²)	9.5 to 11.5 (322.1 to 389.9)	6.0 to 6.8 (203.4 to 230.5)	9.0 to 10.0 (305.1 to 339.0)
Thickness, in. (cm) (min)			
0.1 psi (689 Pa)	0.17 (0.431)	0.05 (0.127)	0.11 (0.279)
1.1 psi (7583 Pa)	0.11 (0.279)	0.03 (0.076)	0.06 (0.152)
Yarns per inch (2.54 cm) (min)			
Wales	28 (28)	31 (31) or [24 (24) <u>1</u> /]	24 (24)
Courses	28 (28)	41 (41) or [39 (39) <u>1</u> /]	31 (31)
Bursting strength, lbs. (Newton) (min)	100 (445)	170 (757)	150 (667)
Elongation, percent (max)			
Course direction	130	75	130
Shrinkage, percent (max)		Circular Knit	Warp Knit
Wales	8.0	6.0	4.0
Courses	5.0	4.0	6.0

1/ Only to be used with alternate construction stated in 3.3.2.

3.8 Width. The width of the napped portion of the finished cloth shall be as specified (see 6.2).

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* 3.9 Length and put-up. Unless otherwise specified (see 6.2), the finished cloth shall be furnished in continuous lengths, each not less than 30 yards (27.3 m). Each length shall be put-up on full width rolls face in with no tension as specified in PPP-P-1133. Splicing is prohibited.

3.10 pH. The pH value of the water extract of the finished cloth shall be not less than 4.0 nor more than 8.5 when tested as specified in 4.6.

3.11 Fiber identification. Each piece shall be labeled, or ticketed for fiber content in accordance with the Rules and Regulations Under the Textile Fiber Products Identification Act.

3.12 Workmanship. The finished cloth shall conform to the quality established by this document. The occurrence of defects shall not exceed the applicable acceptable quality level specified.

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 or order, the contractor may use his own or any other facilities suitable for 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 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification 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 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).

* 4.3 First article inspection. When required (see 3.2 and 6.2), the first article shall be visually examined for appearance, color and finish, and shall be tested for physical and chemical properties in accordance with methods specified in 4.6.

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* 4.4 Quality conformance inspection. Sampling for inspection shall be performed in accordance with MIL-STD-105, except where otherwise indicated.

4.4.1 Component and material inspection. In accordance with 4.1 above, components and materials shall be 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 procurement documents.

4.4.2 Examination of the end item. Examination of the end item shall be in accordance with 4.4.2.1 through 4.4.2.4.

* 4.4.2.1 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 visual defects listed in MIL-STD-1491 shall be classified and scored to the extent that they are clearly visible at normal inspection distance of 3 ± 1 feet on the side of the cloth under examination. Defects listed under 4.4.2.2, overall examination, shall not be scored in 4.4.2.1. All defects found shall be counted regardless of their proximity to each other, except where two or more defects represent a single local 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 wale-wise (lengthwise) yard (0.9 m) or fraction thereof in which it occurs. The sample unit for this examination shall be one linear yard (0.9 m). The lot size shall be expressed in units of one linear yard (0.9 m) each. The sample size for this examination shall be based on inspection level II and the acceptable quality level (AQL) shall be 6.5 defects per 100 units (yards) (0.9 m). The number of rolls from which the sample is to be selected shall be in accordance with Table II. An approximate equal number of yards shall be examined in each roll of the sample.

* 4.4.2.2 Overall examination. Each defect listed below shall be counted not more than once in each roll examined. The sample unit shall be one roll. The sample size (number of rolls selected as sample) and the acceptance number (maximum number of defects acceptable) shall be as shown in Table II. The rolls selected for the yard-by-yard examination shall be included in this examination.

Defects

Edges cut, curled, folded, scalloped, or uneven, intermittently or throughout piece

Width less than specified

Color off shade, mottled, streaky or blotchy, shaded end to end, side to side, side to center, intermittently or throughout the piece

Unevenly napped

Poor dye penetration

Overall uncleanness

Hand and finish not equal to standard sample

Face side of cloth not on inside

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Table II. Sample size

Lot size in yards (.9m)	Sample size in rolls	Maximum number of defects acceptable
Up to 1200 1/	3	0
1201 to 3200	5	0
3201 to 10,000	8	0
10,001 to 35,000	13	0
35,001 to 150,000	20	1
150,001 and over	32	2

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

4.4.2.3 Examination for length.

4.4.2.3.1 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 (1.8m) less than the length marked on the ticket shall be considered a defect with respect to length. The sample size (number of rolls selected as sample) and the acceptance number (maximum number of defects acceptable) shall be as shown in Table II. Any roll containing more than one piece or a splice shall also be considered a defect with respect to length.

* 4.4.2.3.2 Total yardage in sample. The lot shall be unacceptable if the total of the actual lengths of the rolls in the sample is less than the total of the lengths marked on the tickets. The rolls examined shall be those selected for the examination of individual rolls.

* 4.4.2.4 Examination for shade and finish appearance.

* 4.4.2.4.1 Sampling. Each lot shall be examined visually for shade match (see 3.5.1) and finish appearance (see 3.6) in accordance with the table listed below and the provisions contained in the contract. The lot shall be unacceptable if one or more piece fails to meet the requirement for shade match or finish appearance. The sample unit shall be a 4 inch by 20 inch swatch of the cloth. The sample unit shall be drawn from each piece in the sample size:

<u>Lot size</u>	<u>Piece to be Sampled</u>
1 - 8 pieces	each piece
9 - 25 pieces	8 pieces
26 - 90 pieces	20 pieces
91 - 160 pieces	32 pieces
over 160 pieces	1 of 5 pieces

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

4.6 Testing of end item. Prior to testing the cloth shall be preconditioned in accordance with 4.6.1. The methods of testing specified in FED-STD-191, whenever 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 methods except for thickness. For thickness characteristics, the lot average of all sample units in the sample shall apply and the lot shall be unacceptable if the lot average fails to meet the minimum thickness requirements specified. 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 (3.2m), full width of the finished cloth. The lot size shall be expressed in units of one yard (0.9m) each. The lot shall be unacceptable, except for thickness, 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 (yards)</u>	<u>Sample size</u>
800 or less	2
801 up to and including 22,000	3
22,001 and over	5

Table III. Test methods

<u>Characteristic</u>	<u>Requirement paragraph</u>	<u>Test method</u>
Material identification (nylon)	3.3.1	1530 <u>1/</u>
Yarn denier	3.3.2	1/
Yarn filament	3.3.1	Visual <u>1/</u>
Knit	3.4	Visual <u>1/</u>
Color	3.5	Visual <u>2/</u>
Weight oz per yd ² (g/m ²)	3.7	5041
Thickness	3.7	5030 <u>3/</u>
Yarns per inch (2.54 cm)	3.7	5070
Bursting strength	3.7	5120 <u>4/</u>
Elongation	3.7	4.6.2 ⁻
Shrinkage	3.7	5556 <u>5/</u>
Colorfastness to:		
Laundering (after 3 cycles)	3.5.2	5610 <u>6/ 7/ 8/ 9/</u>
Wet dry cleaning	3.5.2	5622
Crocking	3.5.2	AATCC-8
Perspiration	3.5.2	5680
pH	3.10	2811

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- 1/ A contractor's certificate of compliance shall be accepted for this characteristic.
- 2/ One determination per sample unit with result reported as "PASS" or "FAIL".
- 3/ Five, 4 by 4 (10.2 by 10.2 cm) specimens for each load shall be cleanly cut from the fabric. No two specimens shall contain the same walewise or coursewise yarns. The nap shall be facing up and the results shall be the average of 5 readings for each load.
- 4/ Tests shall be performed with nap facing down.
- 5/ The cotton laundering procedure shall be used.
- 6/ The temperature shall be $140 \pm 2^\circ \text{ F}$ ($60 \pm 1^\circ \text{ C}$) for Type II cloth.
- 7/ The specimen must be dried after each complete laundering cycle.
- 8/ Only the stain on the nylon fibers of the color transfer cloth shall be evaluated.
- 9/ Type III does not require colorfastness to laundering testing.

4.6.1 Preconditioning. The fleece shall be preconditioned by placing the sample in a tumble type rotary dryer, having a cylindrical basket approximately 30 inches (76.2 cm) in diameter, 24 inches (61.0 cm) in length and rotating at approximately 35 R.P.M. The dryer shall be provided with a means of maintaining a stack temperature of $140^\circ - 160^\circ \text{ F}$ ($60^\circ - 71^\circ \text{ C}$). The sample shall be tumbled at this temperature range thirty or forty minutes with a twenty to twenty-five pound ballast load. The sample shall then be conditioned as specified in FED-STD-191.

4.6.2 Elongation. Elongation of the cloth in the course direction shall be measured on an inclined plane tester of the IP-4 type. A suitable autographic recording device shall be provided. Five specimens, each containing different wales and courses, shall be cut 4 by 6 inches (10.2 by 15.2 cm) with the long dimension parallel to the course direction. The specimen shall be fastened, without tension or slack, between one inch wide flat type clamps set 3 inches (7.6 cm) apart. The machine shall be run through 10 complete cycles under a maximum test load of 15 pounds (6.75 kg). An individual elongation graph shall be used for each specimen. The elongation shall be the average of the results obtained from the five specimens tested, when measured at the peak of the last recorded cycle, in a line perpendicular to the horizontal zero axis. The results shall be reported to the nearest 1.0 percent.

5. PACKAGING

5.1 Put-up and preservation. Put-up and preservation packaging 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 packaged 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.

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

6. NOTES

6.1 Intended use. The type I cloth is intended for use as a lining material for cold weather clothing. The type II cloth is used as a lining material in the enlisted man's and woman's water repellent and wind resistant utility jacket. The type III cloth is intended for use as a lining material for outerwear.

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

- a. Title, number and date of this document.
- b. Type required (see 1.2).
- c. When a first article is required (see 3.2 and 4.3). The item will be tested and should be a first article sample. The contracting officer should include specific instruction in acquisition documents regarding arrangements for examinations, quantity, testing, and approval of the first article.
- d. Width required (see 3.8).
- e. Length required if other than specified (see 3.9).
- f. Levels of put-up and preservation, and packing (see 5.1 and 5.2).
- g. When short lengths are acceptable (terms, conditions, limitations).

6.3 Standard sample. For access to standard sample, address the procuring office issuing the invitation for bids (see 3.1).

* 6.4 Subject term (key word) listing.

- a. Fabric, knit
- b. Fiber, nylon
- c. Finish, napped

* 6.5 Changes from previous issue. 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 contractors 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.

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MIL-C-17155G**2. DOCUMENT TITLE**
CLOTH, KNITTED, NYLON, FLEECE**3a. NAME OF SUBMITTING ORGANIZATION****4. TYPE OF ORGANIZATION (Mark one)**

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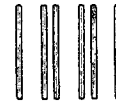
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