

MIL-C-17155F

17 July 1979  
SUPERSEDING

MIL-C-17155E(SA)

17 September 1974

## 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 knitted nylon fleece fabric.

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

Type I - 9.5 to 11.5 oz. per sq. yd., Green 3405  
Type II - 6.0 to 6.8 oz. per sq. yd., Blue 3308  
Type III - 9.0 to 10.0 oz. per sq. yd., Black 3234

#### 2. APPLICABLE DOCUMENTS

2.1 Issue 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

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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, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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FSC - 8305

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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.)

\* LAWS AND REGULATIONS

Rules and Regulations under the  
Textile Fiber Products Identification Act

(Copies may be obtained without charge from the Federal Trade Commission, Washington, D.C. 20580.)

3. REQUIREMENTS

3.1 Standard sample. The finished cloth 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).

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

3.3 Material. (see 6.4).

\* 3.3.1 Fiber. The fiber shall be continuous filament nylon.

\* 3.3.2 Yarns. The nylon yarn for the Type I cloth shall be 200 or 210 deniers for the face and 70 denier for the back. The yarn for the Type II cloth shall be 70 denier for both the face and back or as an alternate construction, 100 denier for the face and 140 denier for the back. The yarn for the Type III cloth shall be 200 denier for the face and 100 denier for the back. (see 4.6).

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

\* 3.5 Color. Unless otherwise specified, the finished cloth shall be dyed to match Green Shade 3405 for type I, Blue Shade 3308 for type II and Black Shade 3234 for type III. The cloth shall be dyed with a suitable type dyestuff.

3.5.1 Matching. The finished cloth shall match the standard sample under artificial daylight having a color temperature of 7500 kelvin and shall be a good approximation to the standard sample under incandescent lamplight at 2800 kelvin.

\* 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 Type I and II only. The finished cloth shall show fastness to laundering (after 3 cycles) drycleaning, perspiration and crocking equal to or better than the standard sample. When no standard sample is available, the finished cloth shall show a minimum of "good" fastness to laundering (after 3 cycles), dry cleaning, perspiration and shall have a Munsell Value for crocking not lower than 8.5 when tested as specified in 4.6.

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

\* 3.6 Physical requirements. The finished cloth shall conform to the physical requirements specified in Table I when tested as specified in 4.6.

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Table 1 - Physical requirements

	Type I	Type II	Type III
Weight, oz./sq. yd (g/m <sup>2</sup> )	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, inches (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 (cm) (min)			
Wales	28 (11)	31(12)or[24(9) <u>1/</u> ]	24 (9)
Courses	28 (11)	41(16)or[39(15) <u>1/</u> ]	31 (12)
Bursting strength, lbs. (Newton) (min)	100 (445)	170 (757)	150 (667)
Elongation, percent (max)			
Course direction	130	75	130
Shrinkage, percent (max)		Circular	Warp
Wales	8.0	Knit	Knit
Courses	5.0	4.0	6.0
		6.0	4.0

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

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

3.8 Length and put-up. Unless otherwise specified, the cloth shall be put-up on rolls, full width, face in with no tension, and shall be furnished in continuous pieces of not less than 15 yards (13.7m) in length as specified in PPP-P-1133. Splicing of the cloth is prohibited.

3.9 Finish. The cloth shall be evenly napped to form a disoriented pile on the face equal to or better than the standard sample.

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

3.10 Fiber identification. Each roll shall be labeled, ticketed or invoiced for fiber content in accordance with the Textile Fiber Products Identification Act.

3.11 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 applicable acceptable quality levels.

#### 4. QUALITY ASSURANCE PROVISIONS

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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 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 the specification where such inspections are deemed necessary to assure that supplies and services conform to the 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).

\* 4.3 First article inspection. When required, the first article submitted in accordance with 3.2 shall be inspected as specified in 4.4.2 for compliance with design, construction, workmanship, appearance, and dimensional requirements.

\* 4.4 Quality conformance inspection. 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 inspected and tested in accordance with all requirements of referenced specifications, drawings and standards unless otherwise excluded, amended, modified, or qualified in this specification or applicable purchase document.

4.4.2 Examination of the end item. Examination of the end item shall be in accordance with 4.4.2.1, 4.4.2.2 and 4.4.2.3.

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. Visual defects as defined in MIL-STD-1491 shall be classified as listed below. 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 (0.9m) or fraction thereof in which it occurs. The sample unit for this examination shall be one linear yard (0.9m). The lot size shall be expressed in units of one linear yard (0.9m) 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) (0.9m). 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.

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 Defects
 

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Any hole, cut, tear or mend  
 Any abraded, thin or weak place  
 Run or dropped stitch  
 Crease or wrinkle, embedded  
 Any spots or any stains, more than 1 inch (2.5 cm) in combined directions  
 Foreign matter 1/  
 Broken or missing yarns resulting in inadequately secured nap  
 Shade Bar 1/  
 Stretch (stitch tension) knitting tension too tight or loose

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1/ Clearly visible at normal inspection distance, approximately 3 feet (0.9m)

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.

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 Defects
 

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Edges cut, curled, rolls, folded, scalloped, or uneven, intermittently or throughout the 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  
 Not labeled in accordance with Textile Fiber Products Identification Act  
 Face side of cloth not on inside

Table II - Sample size

Lot size in yards	Sample size in rolls	Maximum number of defects acceptable
Up to 1200 <u>1/</u>	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.

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4.4.2.3 Examination for length.

4.4.2.3.1. Individual rolls. The rolls shall be examined for gross length. Any gross length found to be less than the specified minimum length, or any gross length found to be more than 2 yards (1.8m) less than the gross length marked on the roll ticket, shall be considered as 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. The rolls selected for the yard-by-yard examination shall be included in this examination. 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 actual gross lengths of rolls in the sample is less than the total of the gross lengths marked on the tickets.

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

4.6 Testing of the end item. Prior to testing the cloth shall be pre-conditioned 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

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Characteristic	Requirement paragraph	Test method
Material identification (nylon)	3.3.1	1530 <u>1/</u>
Yarn denier	3.3.2	<u>1/</u>
Yarn filament	3.3.2	Visual <u>1/</u>
Knit	3.4	Visual <u>1/</u>
Color	3.5	Visual <u>2/</u>
Weight per sq. yd (g/m <sup>2</sup> )	Table I	5041
Thickness	Table I	5030 <u>3/</u>
Yarns per inch (cm)	Table I	5070
Bursting strength	Table I	5120 <u>4/</u>
Elongation	Table I	4.6.2
Shrinkage	Table I	5556 <u>5/</u>
Colorfastness to:		
Laundering (after 3 cycles)	3.5.2	5610 <u>6/ 7/ 8/</u>
Dry cleaning	3.5.2	5622
Crocking	3.5.2	5651
Perspiration	3.5.2	5680
pH	3.9.1	2811

- 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 inch (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 + 2° F (60 + 1° 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.

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° - 160° F (60° - 71° C). The sample shall be tumbled at this temperature range thirty or forty minutes with a twenty to twenty-five pounds ballast load. The sample shall then be conditioned as specified in FED-STD-191.



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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 Preservation - packaging. Preservation-packaging shall be level A or C as specified (see 6.2).

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).

5.2.1 Levels A, B, and C. The cloth shall be packed in accordance with 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. Type I cloth is intended for use as a lining material for cold weather clothing. Type II cloth is used as a lining material in the enlisted man's water repellent and wind resistant utility type blue jacket. 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 specification.
- b. Type required (see 1.2).
- c. When first article is required (see 3.2 and 4.3).
- d. Width of cloth required (see 3.7).
- e. Length, if other than specified (see 3.8).
- f. Levels of packaging and packing required (see 5.1 and 5.2).

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6.3 Standard sample. For access to standard sample, address the procuring 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 specification.

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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DOCUMENT IDENTIFIER (Number) AND TITLE

MIL-C-17155F CLOTH, KNITTED, NYLON, FLEECE

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1 OCT 76

Replaces edition of 1 Jan 72 which may be used.

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