

INCH-POUND

MIL-C-43375E(GL)
18 September 1990
SUPERSEDING
MIL-C-43375D(GL)
21 May 1981

MILITARY SPECIFICATION

CLOTH, DUCK, NYLON, 12.5 OUNCE

This specification is approved for use by the Natick Research, Development and Engineering Center, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers 12.5 ounce, nylon, duck cloth.

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

- Class 1 - Dyed
- Class 2 - Dyed, water-repellent

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be used in improving this document should be addressed to: U.S. Army Natick Research, Development, and Engineering Center, Natick, MA 01760-5014, by using the 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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SPECIFICATIONS

FEDERAL

PPP-P-1135 - Packaging of Duck Fabrics (Cotton; Synthetic Fiber;
Cotton-Synthetic Fiber Blends)

STANDARDS

FEDERAL

FED-STD-4 - Glossary of Fabric Imperfections
FED-STD-191 - Textile Test Methods

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

FEDERAL TRADE COMMISSION

Rules and Regulations Under the Textile Fiber Products Identification Act

(Copies are available from the Federal Trade Commission, Pennsylvania Avenue at Sixth Street, N.W., Washington, DC 20580-0001.)

2.2 Non-Government publications. The following document forms a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (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 27709-2215.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

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

3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 6.3) in accordance with 4.3.

3.2 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 6.4).

3.3 Material.

3.3.1 Yarn. The yarn for the warp shall be 840 nominal denier, bright, multifilament nylon and the yarn for the filling shall be 420 nominal denier, 3 ply or single equivalent denier, bright, multifilament nylon.

3.4 Color. The color of the finished cloth shall be as specified (see 6.2).

3.4.1 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 $7500 \pm 200\text{K}$, with illumination of 100 ± 20 foot candles, and shall be a good match to the standard sample under incandescent lamplight at $2300 \pm 200\text{K}$.

3.4.2 Colorfastness. The finished cloth shall show fastness to laundering and light equal to or better than the standard sample or equal to or better than a rating of "good". The finished cloth shall show fastness to crocking equal to or better than the standard sample or shall have an AATCC Chromatic Transference Scale rating of not less than 3.5. Testing shall be as specified in 4.4.3.

3.4.3 Spectral reflectance. When shade Camouflage Green 483 is specified, the spectral reflectance values (in percent) for visible/near infrared wavelength range of 600 to 860 nanometers of the finished cloth shall meet the requirements specified in table I, when tested as specified in 4.4.3.

TABLE I. Spectral reflectance (percent) limits for Camouflage Green 483

Wavelength, Nanometers (nm)	Reflectance		Wavelength Nanometers (nm)	Reflectance	
	Min.	Max.		Min.	Max.
600	3	10	740	7	52
620	3	10	760	11	60
640	3	10	780	17	64
660	3	11	800	24	67

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TABLE I. Spectral reflectance (percent) limits for Camouflage Green 483
(cont'd)

Wavelength, Nanometers (nm)	Reflectance		Wavelength Nanometers (nm)	Reflectance	
	Min.	Max		Min.	Max.
680	3	15	820	32	70
700	3	28	840	37	75
720	5	40	860	40	78

3.5 Physical requirements. The cloth shall conform to the requirements specified in table II when tested as specified in 4.4.3.

TABLE II. Physical requirements

Weight oz/sq.yd. min	Yarns per inch		Breaking strength		Air permeability cu. ft./min/sq ft. max
	min		pounds min		
	Warp	Filling	Warp	Filling	
12.5	56	28	800	700	3.0

3.5.1 Width. The width of the finished 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 a 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). Raw edges shall not be permitted.

3.5.2 Weave. The weave shall be plain weave, one up, one down.

3.6 Finish. The class 1 cloth shall be desized, scoured, dyed and heat set. The class 2 cloth shall be desized, scoured, dyed, heat set and water repellent treated. The cloth shall not be bleached in any manner or process.

3.6.1 Water repellency, class 2. The class 2 cloth shall be given an approved water repellent treatment (see 6.8). The water repellent shall consist of aluminum salts of saturated carboxylic acids (such as formate, acetate, palimate or stearate), zirconium salts of such saturated carboxylic acids, or a combination of both, mixed with refined mineral and vegetable waxes, titanate esters, or a combination of both. The product shall be applied either in the form of an aqueous emulsion or in the form of a water free solvent solution. Testing shall be as specified in 4.4.3.

3.6.2 Spray rating, class 2. The results of the three determinations on the sample unit for spray rating shall be equal to or better than ratings 90, 90, 80, when tested as specified in 4.4.3.

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3.6.3 pH. The pH value of the water extract shall be not less than 5.5 nor more than 8.5 when tested as specified in 4.4.3.

3.7 Dimensional stability. The cloth shall have an average dimensional change of no more than 2.5 percent in either warp or filling direction with no single determination over 3.0 percent. Testing shall be as specified in 4.4.3.

3.8 Length and put-up. Unless otherwise specified (see 6.2), the cloth shall be furnished in rolls containing not less than 80 yards. Each roll shall contain not more than four pieces and no piece shall be less than 40 yards. The cloth shall be put-up in rolls in accordance with 5.1.

3.9 Face identification. The face of the cloth shall be identified by stamping the word "FACE" on that side at each end of the cloth.

3.10 Fiber identification. Each roll shall be labeled and ticketed for fiber content in accordance with the Rules and Regulations Under the Textile Fiber Products Identification Act.

3.11 Workmanship. The finished cloth shall conform to the quality established by this specification. The demerit points per 100 square yards when calculated as specified in section 4 shall not exceed the established maximum point values.

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 (examinations and tests) 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 specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of section 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 ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

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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 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).

4.3 First article inspection. When a first article is required (see 3.1 and 6.2), it shall be examined for the defects specified in 4.4.2.1 through 4.4.2.4 and tested for the characteristics specified in 4.4.3.

4.4 Quality conformance inspection.

4.4.1 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 specification or applicable purchase document.

4.4.2 End item examination.

4.4.2.1 Yard-by-yard examination. Each roll in the sample shall be examined on the face side only. When the total yardage in the roll does not exceed 100 yards, the entire yardage in the roll shall be examined. When the total yardage in the roll exceeds 100 yards, only 100 yards shall be examined. All defects, as defined in section III of FED-STD-4, which are clearly noticeable at normal inspection distance (3 feet) shall be scored and assigned demerit points as listed in 4.4.2.1.1. No linear yard (increments of 1 yard on the measuring device of the inspection machine) from any one roll within the sample shall be penalized more than four points. The sample size shall be 20 rolls selected from 20 containers. The lot shall be unacceptable if the points per 100 square yards of the total yardage examined exceeds 35 points. The lot shall be unacceptable if the points per 100 square yards of two or more individual rolls exceeds 53 points. If one roll exceeds 53 points per 100 square yards, a second sample of 20 rolls shall be examined only for individual roll quality. The lot shall be unacceptable if one or more rolls in the second sample exceeds 53 points per 100 square yards. Point computation for lot quality and individual roll quality shall be as follows:

<u>Total points scored in sample X 3600</u>	=	Points per 100
Contracted width of cloth (inches) X Total yards inspected		square yards

4.4.2.1.1 Demerit points. Demerit points shall be assigned as follows:

For defects 3 inches or less in any dimension	- one point
For defects exceeding 3 inches, but not exceeding 6 inches in any dimension	- two points

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For defects exceeding 6 inches, but not exceeding 9 inches in any dimension	- three points
For defects exceeding 9 inches in any dimension	- four points

The following defects, when present, shall be scored four points for each yard in which they occur:

Baggy, ridgy or wavy cloth.
 Poor dye penetration, mottled, streaky, cloudy or striated in excess of that shown by the standard sample.
 Overall uncleanness.
 Width less than specified.
 Raw edge.

4.4.2.2 Length examination. 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 2 yards less than the length marked on the ticket shall be considered a defect with respect to length. The lot shall be unacceptable if two or more rolls in the sample are defective with respect to length or if the total of the actual lengths of rolls in the sample is less than the total of the lengths marked on the tickets.

4.4.2.3 Shade and finish appearance examination. During the yard-by-yard examination, each roll in the sample shall be examined for shade and finish appearance. Any roll in the sample off shade (compared to the standard sample and applicable shade range) or shaded side to side, side to center, or end to end, or any roll that does not have the same finish appearance as the standard sample shall be cause for rejection of the entire lot represented by the sample.

4.4.2.4 Roll identification examination. During the yard-by-yard examination, each roll in the sample shall be examined for the defects listed below. The lot shall be unacceptable if two or more rolls in the sample contain one or more of the following defects:

Not labeled or ticketed in accordance with the Rules and Regulations Under the Textile Fiber Products Identification Act.
 Face marking missing from either or both ends.
 Face marking on wrong side.

4.4.3 End item testing. The cloth shall be tested for the characteristics listed in table III. 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 result of the determinations made on a sample unit for test purposes as specified in the applicable test methods. All test reports shall contain the individual values used in expressing the final results. The sample unit shall be 3 continuous yards full width of the finished cloth. The lot size shall be expressed in units of 1 yard. The lot shall be unacceptable if one or more sample units fail to meet any requirement specified. The sample size shall be in accordance with the following:

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

TABLE III. End item Tests

<u>Characteristic</u>	<u>Requirement paragraph</u>	<u>Test method</u>
Nylon yarn:		
Luster	3.3.1	<u>1/</u>
Denier:		
Warp yarn	3.3.1	<u>1/</u>
Filling yarn	3.3.1	<u>1/</u>
Yarn ply	3.3.1	<u>1/</u>
Colorfastness to:		
Laundering	3.4.2	5614
Light	3.4.2	5660
Crocking	3.4.2	5651
Spectral reflectance (camouflage green 483)	3.4.3	4.5 1
Weight	3.5	5041
Yarns per inch	3.5	5050
Breaking strength	3.5	5100
Air permeability	3.5	5450
Weave	3.5.2	Visual <u>2/</u>
Finish	3.6	<u>1/</u>
Absence of bleaching	3.6	<u>1/</u>
Water repellency (class 2)	3.6.1	<u>1/</u>
Spray rating (class 2)	3.6.2	5526
pH	3.6.3	2811
Dimensional stability	3.7	5556

1/ Unless otherwise specified, a certificate of compliance shall be submitted and will be acceptable for the stated requirement.

2/ One determination shall be made from each sample unit and the result reported as "pass" or "fail".

4.4.4 Packaging inspection. The inspection shall be in accordance with the quality assurance provisions of PPP-P-1135.

4.5 Methods of inspection.

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4.5.1 Spectral reflectance test. Spectral reflectance data shall be obtained from 600 to 860 nanometers (nm), at 20 nm intervals on a spectrophotometer (see 6.5) relative to a barium sulfate standard, the preferred white reference standard. Other white reference materials may be used, provided they are calibrated to absolute white; e.g. Halon, magnesium oxide, or vitrolite tiles (see 6.6). The spectral band width shall be less than 25 nm at 860 nm. Reflectance measurements may be made by either the monochromatic or polychromatic mode of operation. When the polychromatic mode is used, the spectrophotometer shall operate with the specimen diffusely illuminated with the full emission of a continuous source that simulates in the visible spectrum either CIE Source A or CIE Source D65. The specimen shall be measured as a single layer, backed with two layers of the same fabric and shade. Readings will be taken on a minimum of two different areas and the data averaged. The specimen shall be viewed at an angle no greater than 10° from normal with the specular component included. Photometric accuracy of the spectrophotometer shall be within 1 percent and the wavelength accuracy within 2 nm. The standard aperture size used in the color measurement device shall be 1.0 to 1.25 inches in diameter. When the measured reflectance values at four or more wavelengths do not meet the limits specified in 3.4.3, it shall be a test failure.

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 on rolls and preserved in accordance with the applicable requirements of PPP-P-1135.

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-1135.

5.3 Marking. In addition to any special marking required in the contract or purchase order, shipments shall be marked in accordance with the applicable requirements of PPP-P-1135.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The cloth is intended for use in collapsible canteen covers and other equipage items.

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6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Class required (see 1.2).
- c. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
- d. When first article is required (see 3.1, 4.3, and 6.3).
- e. Color of cloth required (see 3.4).
- f. Width of cloth required (see 3.5.1).
- g. Length of roll, if other than specified (see 3.8).
- h. Levels of preservation and packing (see 5.1 and 5.2).

6.3 First article. When a first article is required, it shall be inspected and approved under the appropriate provisions of FAR 52.209. The first article should be a preproduction sample. The contracting officer should specify the appropriate type of first article and the number of units to be furnished. The contracting officer should also include specific instructions in acquisition documents regarding arrangements for selection, inspection, and approval of the first article.

6.4 Sample. For access to samples, address the contracting activity issuing the invitation for bids.

6.5 Spectrophotometers. Suitable spectrophotometers for measuring spectral reflectance in the visible/near infrared are the Diano Hardy, Diano Match Scan, Hunter D54P-IR and Macbeth 1500 with IR options.

6.6 White standard. Barium sulfate of suitable quality for use as a white reference standard is available from the Eastman Kodak Company. The same source has available, magnesium reagent (ribbon) and Halon. Suitable tiles can be obtained from the National Bureau of Standards or the instrument manufacturers.

6.7 Dye combinations for Camouflage Green 483. A suggested but not mandatory dye combination for Camouflage Green 483 is as follows:

Acid Orange - 162
Acid Blue - 171

6.8 Formula approval. Approval of formulations is the responsibility of the Natick Research, Development, and Engineering Center, Natick, MA 01760-5014 and is based on extensive tests including those for toxicity which are not set forth in this document. Because of the time required to evaluate and approve new treatments (approximately 6 months), only those chemical treatments already approved will be considered acceptable for the related procurement. Information pertaining to approval of new treatments should be obtained from the Natick Research, Development, and Engineering Center. The list of approved treatments may be obtained from the contracting activity.

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6.9 Subject term (key word) listing.

Canteen
Cover
Equipage
Water repellent treated

6.10 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.

Custodian:

Army - GL

Preparing activity:

Army - GL

Review activities:

Army - MD, ME
DLA - CT

(Project 8305-A325)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.

2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of 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.

RECOMMEND A CHANGE:	1 DOCUMENT NUMBER MIL-C-43375E (GL)	2 DOCUMENT DATE (YYMMDD) 199C September 18
3. DOCUMENT TITLE CLOTH, DUCK, NYLON, 12.5 OUNCE		
4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed)		
5. REASON FOR RECOMMENDATION		
6. SUBMITTER		
a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (if applicable)	e. DATE SUBMITTED (YYMMDD)
7. PREPARING ACTIVITY		
a. NAME U.S. Army Natick RD&E Center	b. TELEPHONE (Include Area Code) (1) Commercial 508-651-5221	(2) AUTOVON 256-5221
c. ADDRESS (Include Zip Code) Commander, U.S. Army Natick RD&E Center ATTN: STRNC-ES Natick, MA 01760-5014	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT. Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	