MIL-C-484H
11 February 1985
SUPERSEDING
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2 February 1972

MILITARY SPECIFICATION

CLOTH, WIND RESISTANT OXFORD, COTTON, QUARPEL TREATED

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

1. SCOPE

1.1 Scope. This document covers a "Quarpel" treated (see 6.5), wind-resistant cotton oxford cloth.

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

Type I - 6.5 to 7.2 ounces per square yard
Type VI - 5.5 to 6.2 ounces per square yard

2. APPLICABLE DOCUMENTS

* 2.1 Government documents. Unless otherwise specified, the following documents of the issue in effect on the date of invitation for bids or request for proposal, form a part of this document to the extent specified herein.

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 and Development 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.

FSC 8305

SPECIFICATIONS

FEDERAL

V-T-276 - Thread, Cotton
PPP-P-1134 - Packaging of Cotton and Cotton-Synthetic Fiber Blend Fabrics (Excluding Duck Fabrics)

STANDARDS

FEDERAL

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

MILITARY

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

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

OTHER GOVERNMENT DOCUMENTS

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.)

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

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

Chromatic Transference Scale

Method No. 118 - Oil Repellency: Hydrocarbon Resistance Test

(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.

3. REQUIREMENTS

3.1 Standard sample. The finished cloth shall match the standard sample for shade and appearance 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 Material.

3.2.1 Yarn. The yarn shall be made from cotton which has been cleaned, carded, combed, drawn and spun. The yarn shall be single or two ply as specified in table 1.

* 3.3 Color. The color shall be as specified (see 6.2 and 6.4). The use of dyes or substances containing elementary sulfur or compounds capable of oxidation to sulfuric acid is prohibited. The dyed and finished cloth shall contain no more labile sulfur than shown by the standard sample when tested as specified in 4.2.3. When a standard sample is not available, the dyed and finished cloth shall show not more than a slight trace of labile sulfur when tested as specified in 4.2.3.

3.3.1 Matching. The color of the finished cloth shall match the standard sample under artificial daylight having a correlated color temperature of 7000 ± 500 K and shall be a good approximation to the standard sample under incandescent lamplight at 2850 ± 100 K.

3.3.2 Colorfastness. The dyed and finished cloth shall show fastness to laundering, perspiration, light, and crocking, equal to or better than the standard sample when tested as specified in 4.2.3. When no standard sample has been established or designated as applicable to colorfastness, the finished cloth shall show good fastness to laundering, perspiration, and light and shall show an AATCC Chromatic Transference Scale rating for crocking not lower than 3.5 except that black and dark-blue shades shall show fastness to wet crocking not lower than 2.5 on the AATCC Chromatic Transference Scale when tested as specified in 4.2.3.

3.4 Physical requirements. The finished cloth shall conform to the requirements shown in table I when tested as specified in 4.2.3.

TABLE I. Physical requirements

Type	Weight, ounces per square yard		Yarns per inch, minimum		Breaking strength, minimum, pounds		Yarn ply		Weave
	Min.	Max.	Warp	Filling	Warp	Filling	Warp	Filling	
I	6.5	7.2	130	54	135	50	1	1	Oxford (2 ends weaving as one)
VI	5.5	6.2	196	86	170	80	2	1	

3.4.1 Width. The width shall be as specified (see 6.2) and shall be the minimum acceptable width, inclusive of selvages, when woven on fly shuttle looms, and exclusive of selvages and fringes when woven on shuttleless looms.

3.4.2 Stiffness (type VI only). The maximum flex-stiffness for type VI cloth shall be 0.00050 inch-pounds for the warp and 0.00035 inch-pounds for the filling direction when tested as specified in 4.2.3.

3.5 Finish. The cloth shall be singed, scoured, and mercerized; then dyed and water repellent treated (see 3.7).

3.5.1 Nonfibrous materials. The finished cloth, prior to the application of the water repellent treatment, shall not contain more than 2.0 percent starch and protein content, including chloroform-soluble and water-soluble material, when tested as specified in 4.2.3.

3.6 Shrinkage. The cloth shall be preshrunk and shall not shrink more than 2.0 percent in either the direction of the warp or of the filling when tested as specified in 4.2.3. The preshrinking process shall not be identified by name or trademark, either on the cloth or on the ticket or package.

3.7 Water repellency and air permeability. The cloth shall be given a approved Quarpel type (see 6.5) water-repellent treatment and shall conform to the water-repellency and air-permeability requirements of 3.7.1 and table II when tested as specified in 4.2.3. The use of materials other than approved water-repellents and sodium acetate buffer (and acetic acid) is prohibited.

TABLE II. Water-repellency and air permeability requirements

Types		Hydrostatic height minimum		Dynamic absorption maximum		Air permeability cu. ft./minute max. (avg.)
		Average cm	Min. 1/ cm	Average Percent	Max. 2/ Percent	
Initial	I, VI	35	30	25	30	-
After 3 launderings	I	30	25	-	-	4.0
After 3 launderings	VI	35	30	-	-	3.5
After 15 launderings	I, VI	-	-	25	30	-

1/ No single determination shall fall below the specified minimum.

2/ No single determination shall exceed the specified maximum.

3.7.1 Spray rating. The measurements of the three individual determinations on the sample unit for initial spray rating, when tested as specified in 4.2.3, shall be equal to or better than 90, 90, 80.

3.7.2 Resistance to organic liquid. The finished cloth shall not show wetting by n-tetradecane either initially or after 15 launderings when tested as specified in 4.2.3.

3.8 pH. The pH value of the finished cloth shall be no lower than 5.5 nor more than 8.5 when tested as specified in 4.2.3.

3.9 Seam efficiency. The finished cloth shall have a minimum seam efficiency of 80 percent when tested as specified in 4.2.3.

3.10 Length and put-up. Unless otherwise specified (see 6.2), the cloth shall be furnished in continuous lengths, each not less than 40 yards. Each length shall be put-up on a roll as specified in 5.1.

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

* 3.12 Marking. The face side of the cloth shall be identified by applying a stamping on that side of the cloth with the word "Face" at each end of the piece.

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

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 the document 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 Quality conformance inspection. Unless other 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. 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 I of FED-STD-4, which are clearly noticeable at normal inspection distance (3 feet), shall be scored and assigned demerit points as listed in 4.2.2.1.1 except that only those slubs and knots which exceed the limits shown on Sears Fabric Defect Scales (see 6.6), E for slubs and D for knots shall be scored. No linear yard (increments of 1 yard on the measuring device of the inspection machine) from any one roll within 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 the following point values:

28 points for type I cloth
40 points for type VI cloth

The lot shall be unacceptable if the points per 100 square yards of two or more individual pieces exceeds the following point values:

42 points for type I cloth
60 points for Type VI cloth

If one roll exceeds the point level 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 the point level per 100 square yards. Point computation for lot quality and individual roll quality shall be as follows:

$$\frac{\text{Total points scored in sample} \times 3600}{\text{Contracted width of cloth (inches)} \times \text{Total yards inspected}} = \text{Point per 100 square yards}$$

* 4.2.2.1.1 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
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
Objectionable odor
Width less than specified
Poor dye penetration, mottled, streaky, or cloudy
Excessive neppiness

4.2.2.2 Length examination.

4.2.2.2.1 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 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.

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

4.2.2.3 Shade and appearance examination. During the yard-by-yard examination, each roll in the sample shall be examined for shade and appearance. Any roll in the sample off shade; shaded side to side, side to center, or end to end; or not having the same appearance as the standard sample shall be cause for rejection of the entire lot represented by the sample.

* 4.2.2.4 Roll identification marking. During the yard-by-yard examination, each roll in the sample shall be examined for defects listed below. The lot shall be unacceptable if two or more defects are present in the sample.

Preshrinkage process identified by name or trademark on the cloth or ticket.

Not labeled or ticketed in accordance with the Rules and Regulations Under the Textile Fiber Products Identification Act.

Face stamping missing from either or both ends.

Face stamping on wrong side.

* 4.2.3 End item testing. The cloth shall be tested for the characteristics listed in table III. The method 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, except where otherwise specified, apply to the results 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 results. The sample unit shall be 1/4 yard full width of the dyed cloth prior to treatment, and 6-1/2 continuous yards full width of the finished cloth for widths up to and including 41 inches and 6 continuous yards full width of the finished cloth for widths of 42 inches and over. The lot shall be unacceptable if one or more sample units fail to meet any test requirement specified. the sample size shall be in accordance with the following:

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

TABLE III. End item tests

Characteristic	Requirement paragraph	Test method
Identification of cotton	3.2.1	1200 1/
Combed cotton yarns	3.2.1	1/
Labile sulfur	3.3	2020
Colorfastness to:		
Laundering	3.3.2	5610
Perspiration	3.3.2	5680
Light	3.3.2	5660
Crocking	3.3.2	5651
Weight	3.4	5041
Yarns per inch	3.4	5050
Breaking strength	3.4	5100
Yarn ply	3.4	Visual 2/
Weave	3.4	Visual 2/
Flex-stiffness	3.4.2	5206
Mercerization	3.5	Microscopic examination 1/ 2/
Singed	3.5	1/
Nonfibrous material content	3.5.1	2611
Shrinkage	3.6	5550
Water repellent material	3.7	3/

TABLE III. End item tests (cont'd)

Characteristic	Requirement paragraph	Test method
Hydrostatic pressure:		
Initial	3.7	5514
After 3 launderings (cotton method)	3.7	5556, 5514
Dynamic absorption:		
Initial	3.7	5500
After 15 launderings (cotton method)	3.7	5556, 5500
Air permeability:		
After 3 launderings (cotton method)	3.7	5556, 5450
Water repellency:		
Spray rating	3.7.1	5526
Resistance to organic liquid:		
Initial	3.7.2	AATCC Method 118 4/
After 15 launderings (cotton method)	3.7.2	5556 and AATCC Method 118 4/
pH	3.8	2811
Seam efficiency	3.9	5110 5/

1/ 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 results reported as "pass" or "fail." Both the warp and filling direction shall be tested for yarn ply.

3/ The contractor shall report the water repellents used and certify that no other material except the specified buffer (and acetic acid) has been added.

4/ Except that the time of drop observation shall be 60 seconds. Evidence of wetting on one or more specimens shall be considered cause for rejection of the lot represented by the sample.

5/ The thread shall conform to V-T-276 and the needle and thread sizes shall be as follows:

Cloth (type)	Diameter of needle (round point) blade at the eye	Thread size Top	Thread size Bottom
I	0.04 ± 0.001 inch	40/3	60/3
VI	0.036 ± 0.001 inch	40/3	60/3

4.2.4 Packaging inspection. The inspection shall be in accordance with the quality assurance provisions of PPP-P-1134.

* 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-1134.

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-1134.

5.3 Marking. In addition to any special marking required by the contract or purchase order, shipments shall be marked in accordance with the applicable requirements of PPP-P-1134.

6. NOTES

6.1 Intended use. The cloth is intended for use in clothing where a high degree of wind resistance and water resistance is of prime importance.

6.2 Ordering data. Acquisition documents should specify the following:

a. Title, number, and date of this document.
b. Type of cloth required (see 1.2).
c. Color of cloth required (see 3.3).
d. Width of cloth required (see 3.4.1).
e. Put-up required if other than specified (see 3.10).
f. Selection of applicable levels of preservation and packing (see 5.1 and 5.2).

6.3 Standard sample. For access to standard sample, address the contracting office issuing the invitation for bids.

6.4 Dye formulation. Satisfactory results in achieving the proper shade for Olive Green 107 and colorfastness have been obtained with an appropriate combination of the following dyes:

Shade Olive Green 107:
Vat Black 25, CI 69525
Vat Green 3, CI 69500
Vat Green 8, CI 71050

Shaded with either or both of the following:
Vat Brown 3, CI 69015
Vat Yellow of suitable fastness

The redness of shade should result from the predominant use of the main colors and not from the shading colors.

6.5 Quarpel water repellent. The "Quarpel type" water repellent treatment consists of the co-application of an emulsified fluorocarbon and a buffered quaternary ammonium salt type of repellent. Approval of such components and combinations is the responsibility of the U.S. Army Natick Research and Development Center, Natick, MA. 01760-5014 and is based on more extensive tests, including those for toxicity, which are not set forth in this document. Because of the time necessary to conduct full evaluation (approximately 6 months) only those chemical treatments already approved and so listed in the invitation for bid or request for proposal shall be considered acceptable for the related procurement.

* 6.6 Fabric defect scales. Fabric Defect Replica Kits are available from Sears Roebuck and Company, Department 817, (ATTN: BSC 23-29), Sears Tower, Chicago, IL 60684.

* 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 irrespective of the marginal notations and relationship to the last previous issue.

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Navy - NU
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Army - GL

Project No. 8305-0265

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-C-484H	Cloth, Wind Resistant Oxford, Cotton, Quarpel Treated

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)*

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NATICK OP, 20 Nov 84

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