

INCH-POUND

MIL-DTL-484J

06 February 2006

SUPERSEDING

MIL-C-484H

11 February 1985

DETAIL SPECIFICATION

CLOTH, WIND RESISTANT OXFORD, COTTON, WATER REPELLENT 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 water repellent and wind resistant cotton oxford cloth.

1.2 Classification. (See 6.2.).

Type I - 6.5 to 7.2 ounces per square yard

Type VI - 5.5 to 6.7 ounces per square yard

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in Sections 3, 4 or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in Sections 3, 4 or 5 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 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 cited in the solicitation or contract (see 6.2).

Comments, suggestions, or questions on this document should be addressed to: Defense Supply Center Philadelphia, Clothing and Textiles Directorate, Attn: DSCP Standardization Team, 700 Robbins Avenue, Philadelphia, PA 19111-5092 or emailed to <http://ct.dscp.dla.mil>. Since contact information can change, you may want to verify the currency of this address information using Acquisition Streamlining and Standardization Information System (ASSIST) online database at <http://assist.daps.dla.mil>.

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FEDERAL SPECIFICATION

V-T-295 Thread Nylon

FEDERAL STANDARDS

FED-STD - 4 - Glossary of Fabric Imperfections

(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2.2 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 or contract.

FEDERAL TRADE COMMISSION

Rules and Regulations Under the Textile Fiber Products Identification Act

(Copies are available online at www.ftc.gov from the Federal Trade Commission, 600 Pennsylvania Avenue, N.W., Washington, DC 20580-0001.)

2.3 Non-Government standards and other publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents are those cited in the solicitation or contract (see 6.2).

AMERICAN SOCIETY FOR QUALITY

ANSI/ASQ Z1.4 - Sampling Procedures and Tables for Inspection by Attributes

(Copies of documents are available online at www.asq.org or from the American Society for Quality, 600 North Plankinton Avenue, Milwaukee, WI 53203-2914.)

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

- AATCC Test Method 8 - Colorfastness to Crocking: AATCC Crockmeter Method
- AATCC Test Method 15 - Colorfastness to Perspiration
- AATCC Test Method 16 - Colorfastness to Light
- AATCC Test Method 20 - Fiber Analysis: Qualitative
- AATCC Test Method 22 - Water Repellency: Spray Test
- AATCC Test Method 61 - Colorfastness to Laundering, Home and Commercial:
Accelerated
- AATCC Test Method 70 - Water Repellency: Tumble Jar Dynamic Absorption Test
- AATCC Test Method 81 - pH of the Water-Extract from Wet Processed Textiles
- AATCC Test Method 96 - Dimensional Changes in Commercial Laundering of
Woven and Knitted Fabrics Except Wool
- AATCC Test Method 118 - Oil Repellency: Hydrocarbon Resistance Test
- AATCC Test Method 127 - Water Resistance: Hydrostatic Pressure Test
- AATCC Evaluation Procedure 1 - Gray Scale for Color Change
- AATCC Evaluation Procedure 2 - Gray Scale for Staining
- AATCC Evaluation Procedure 8 - AATCC 9-Step Chromatic Transference Scale

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AATCC Evaluation Procedure 9 - Visual Assessment of Color Difference of Textiles

(Copies of documents are available on line at www.aatcc.org or from the American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709-2215.)

ASTM INTERNATIONAL

- ASTM-D-737 - Test Method for Air Permeability of Textile Fabrics
- ASTM-D-1388 - Standard Test Method for Stiffness of Fabrics
- ASTM-D-1683 - Standard Test Method for Failure in Sewn Seams of Woven Apparel Fabrics.
- ASTM-D-3775 - Standard Test Method for Fabric Count of Woven Fabric
- ASTM-D-3776 - Standard Test Methods for Mass per Unit Area (Weight) of Fabric
- ASTM-D-5034 - Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Grab Test)
- ASTM-D-6193 - Standard Practice for Stitches & Seams

(Copies of documents are available on line at www.astm.org or from the ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19426-2959.)

Principle and Methods of Toxicology, A Wallace Hayes (editor), 1989, pp 394-396, 1989

(Copies of this document is available from Raven Press, 1185 Avenue of the Americas, New York, NY 10036.)

Marzulli, F. and H. Maibach, "Contact Allergy: Predictive Testing in Humans,"
Advances in Modern Toxicology, Volume 4, pp 353-372, 1977

(Copies of this document are available from the U.S. Army Center for Health Promotion and Preventative Medicine, ATTN: MCHB-DC-TTE, Bldg., E-2100, Aberdeen Proving Ground, MD 21010-5422.)

2.4 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 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 in accordance with 4.2.

3.2 Standard sample. The finished cloth shall match the standard sample for shade and appearance and shall, unless otherwise indicated, 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 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

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3.3.1 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 II when tested as specified in 4.4.3.

3.4 Color. The color shall be as specified (see 6.2).

3.4.1 Labile sulfur. Use of dyes and compounds containing elementary sulfur capable of oxidation to sulfuric acid is not permitted.

3.4.2 Visual shade matching (all classes). The color and appearance of the material shall match the standard sample when viewed using the AATCC Evaluation Procedure 9, Option A, with sources simulating artificial daylight D75 illuminant with a color temperature of 7500 ± 200 K illumination of 100 ± 20 foot candles, and shall be a good match to the standard sample under incandescent lamplight at 2856 ± 200 K.

3.4.3 Colorfastness. The finished cloth shall conform to the colorfastness requirements listed below in Table I when test as specified in 4.4.3.

TABLE I. Colorfastness requirements (all Classes).

| Colors Evaluation | Light (40 hrs or 170 kJ) <u>2/</u> (min.) | Laundering (4 cycles) <u>1/</u> (min.) | Perspiration (acid & alkali) <u>1/</u> (min.) | Crocking <u>3/</u> (min.) |
|-------------------------------------|---|--|---|---------------------------|
| All colors | 3-4 | 3-4 | 3-4 | |
| All colors except Black and Dk Blue | | | | 3.5 |
| Black and Dark Blue | | | | 2.5 |

1/ Rated using the AATCC Evaluation Procedure 1 Gray Scale for Color Change and AATCC Evaluation Procedure 2 Gray Scale for Staining.

2/ Rated using the AATCC Evaluation Procedure 1 Gray Scale for Color Change

3/ Rated using the AATCC Evaluation Procedure 8 9-Step Chromatic Transference Scale

3.5 Physical requirements. The finished cloth shall conform to the requirements shown in Table I when tested as specified in 4.4.3.

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TABLE II. Physical requirements

| Characteristic | Type I | Type VI |
|--|--------|---------|
| Weight, oz./sq.yd. | | |
| Minimum | 6.5 | 5.5 |
| Maximum | 7.2 | 6.7 |
| Yarns per inch, (minimum) | | |
| Warp | 130 | 196 |
| Filling | 54 | 86 |
| Breaking strength (pounds), minimum | | |
| Warp | 135 | 170 |
| Filling | 50 | 80 |
| Air permeability (cu. ft./min/sq. ft.) <u>1/</u> | 4.0 | 3.5 |
| Yarn Ply | | |
| Warp | 1 | 2 |
| Filling | 1 | 1 |

1/ After 3 launderings.

3.6 Weave. The weave shall be oxford weave (a plain weave with two warp ends weaving as one) when tested as specified in 4.4.3. The use of fly shuttle or shuttleless loom is permitted.

3.6.1 Width. For government procurements only, 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 woven on fly shuttle looms and exclusive of selvages and fringes when woven on shuttleless looms.

3.6.2 Stiffness (Type VI only). The maximum flex-stiffness shall be 0.00050 inch-pounds for the warp and 0.00035 inch-pounds for the filling direction when tested as specified in 4.4.3.

3.7 Finish. The cloth shall be singed, scoured and mercerized; than dyed and given a water repellent treatment as specified in 3.7.1.

3.7.1 Water repellency. The cloth shall be given a fluorocarbon (Quarpel Type) water repellent treatment. Testing shall be as specified in 4.4.3.

TABLE III. Water repellency requirements

| | Dynamic absorption (percent) | | Hydrostatic pressure (centimeter) | | Spray rating <u>3/</u> |
|-------------------------------|------------------------------|----------------|-----------------------------------|------|------------------------|
| | Max. lot avg. | Max. <u>1/</u> | Min. lot avg. <u>2/</u> | Min. | |
| Initial | 25 | 30 | 35 | 30 | 90, 90, 80 |
| After 3 launderings (Type I) | --- | --- | 30 | 25 | ---- |
| After 3 launderings (Type VI) | --- | --- | 35 | 30 | ---- |
| After 15 launderings | 25 | 30 | --- | --- | ---- |

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- 1/ No single determination shall exceed the specified maximum.
- 2/ No single determination shall fall below the specified minimum.
- 3/ The results of the three individual determinations on the sample unit for spray rating shall be equal to or better than the specified ratings when tested as specified in 4.4.3.

3.8 pH. The pH of the water extract of the finished cloth shall be not lower than 5.0 or higher than 8.5 when tested as specified in 4.4.3.

3.9 Resistance to organic liquid. The finished cloth shall show no wetting by n-tetradecane, initially and after 15 launderings when tested as specified in 4.4.3.

3.10 Dimensional stability. The shrinkage or elongation both in the warp and in the filling of the finished cloth shall be not be greater than 2.5 percent for the individual sample unit and not greater than 2.0 percent for the lot average when tested as specified in 4.4.3.

3.11 Seam efficiency. The finished cloth shall have a seam efficiency of not less than 80 percent when tested as specified in 4.4.3.

3.12 Length and put-up. For Government procurements only, unless otherwise specified (see 6.2), the finished cloth shall be furnished in continuous lengths, each not less than 40 yards. Each length shall be put-up full width on a roll as specified in 5.1.

3.13 Fiber identification. Each roll of finished cloth shall be labeled or ticketed for fiber content in accordance with the Rules and Regulations under the Textile Fiber Products Identification Act.

3.14 Marking. The face side of the cloth shall be marked by applying a stamping on that side of the cloth and the word "Face" on each end of the roll.

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

3.16 Toxicity. The finished fabric shall not present a health hazard when used as intended and tested as specified in 4.4.3.

4. VERIFICATION

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

- a. First article inspection (see 4.2).
- b. Conformance inspection (see 4.3).

4.2 First article inspection. A first article, when specified (see 6.2), submitted in accordance with 3.1, shall be inspected, examined for appearance, color and finished defects and tested for the characteristics as specified in Table IV.

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4.3 Conformance inspection. Conformance inspection shall include the examination of 4.4 and the tests of 4.4.3 as applicable. Sampling for inspection shall be performed in accordance with ANSI/ASQ Z1.4 and with quality acceptance levels as specified in the contract and/or order, except where otherwise indicated.

4.3.1 Material inspection. In accordance with 4.1 above, the material shall be inspected in accordance with all the requirements of referenced documents, unless otherwise excluded, amended, modified or qualified in this specification or applicable procurement documents.

4.4 Examination. Each roll in the sample shall be examined yard-by-yard 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 4.4.1 except that only those slubs and knots which exceed the limits shown on Sears Fabric Defect Scales (see 6.5), "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 examined exceeds 28.0 points for Type I and 40.0 points for Type VI. The lot shall be unacceptable if the points per 100 square yards of two or more individual rolls exceeds 42.0 points for Type I and 60.0 points for Type VI. If one roll in the sample exceeds 42.0 points for Type I and 60.0 points for Type VI per 100 square yards, a second sample of 20 rolls shall be examined for individual roll quality only. The lot shall be unacceptable if one or more rolls in the second sample exceeds 42.0 points for Type I and 60.0 points for Type VI per 100 square yards. Point computation for lot quality and individual roll quality shall be as follows:

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

4.4.1 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:

- Objectionable odor
- Baggy, ridgy, or wavy cloth
- Poor dye penetration, mottled, streaky, or cloudy
- Excessive nappiness

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4.4.2 Toxicity test. The contractor must furnish information, which certifies that the finished product is composed of materials, which have been safely used commercially or provide sufficient toxicity data to show compatibility with prolonged, direct skin contact. At a minimum, toxicity data should include results from a primary dermal irritation study in laboratory animals and a repeated insult human patch test (Modified Draize Procedure). The latter must be conducted under the supervision of a qualified dermatologist using at least 100 free-living individuals.

4.4.2.1 Toxicity documents. All finishes/chemicals used to process the garment shall be identified and accompanied by the appropriate Material Safety Data Sheet (MSDS) information. The use of chemicals recognized by the Environmental Protection Agency (EPA) as human carcinogens is prohibited.

4.4.3 End item testing. The cloth shall be tested for the characteristics listed in Table III. The method of testing as specified wherever applicable and as listed in Table III shall be followed. All test reports shall contain the individual values utilized in expressing the final results. The sample unit shall be 5 continuous yards full width of the finished cloth for all physical and chemical tests. The lot shall be unacceptable if one or more sample units or the lot average for dimensional stability fail to meet any test requirement specified. The sample size shall be in accordance with the following:

| <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 IV. End item tests.

| Characteristic | Requirement paragraph | Test method |
|--------------------------------|-----------------------|---------------------------|
| Fiber Content | 3.3.1 | AATCC-20 |
| Yarn ply | 3.3.1 | Visual |
| Colorfastness to: | | |
| Light (after 40 hrs or 170 kJ) | 3.4.2 | AATCC-16, Opt 1 or 3 |
| Laundering (after 4 cycles) | 3.4.2 | AATCC-61, Test 3A |
| Perspiration (acid & alkaline) | 3.4.2 | AATCC-15 |
| Crocking | 3.4.2 | AATCC -8 |
| Weight | 3.5 | ASTM-D-3776 OptC |
| Yarns per inch | 3.5 | ASTM-D-3775 |
| Breaking strength | 3.5 | ASTM-D-5034, G-E or G-T |
| Air permeability | 3.5 | ASTM-D-737 |
| Weave | 3.6 | Visual 1/ |
| Flex-stiffness | 3.6.2 | ASTM-D-1388 |
| Water repellent treatment: 2/ | | |
| Dynamic absorption: | | |
| Initial | 3.7.1 | AATCC-70 |
| After 15 launderings | 3.7.1 | AATCC-96, VIc 3/ AATCC 70 |

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TABLE IV. End item tests. - Continued

| Characteristic | Requirement paragraph | Test method |
|--|-----------------------|-----------------------------------|
| Water repellent treatment: <u>3/</u> (cont'd) | | |
| Hydrostatic pressure: | | |
| Initial | 3.7.1 | AATCC-127 |
| After 3 launderings | 3.7.1 | AATCC-127 AATCC 96 VIc <u>4/</u> |
| Spray rating: | | |
| Initial | 3.7.1 | AATCC-22 |
| pH | 3.8 | AATCC-81 |
| Resistance to organic liquid: | | |
| Initial | 3.9 | AATCC-118 |
| After 15 laundering | 3.9 | AATCC-96, VIc <u>3/</u> AATCC-118 |
| Dimensional stability | 3.10 | AATCC-96, VIc <u>5/</u> |
| Seam efficiency | 3.11 | ASTM D 1683 <u>6/</u> |
| Toxicity | 3.16 | 4.4.2 |

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

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

3/ The last two wash cycles shall be performed without the use of detergent. The specimens shall be dried after each laundering.

4/ An additional laundering procedure shall be performed without the use of detergent. The specimens shall be dried after each laundering..

5/ The dimensional stability shall be performed after 1 cycle. The cloth shall not be pressed after tumble drying prior to measurement.

6/ The thread shall conform to Type B of V-T-295 using seam Type LSc-2 and stitch Type 301 or 401 as specified in ASTM D 6193 using 12 ± 1 stitches per inch. A needle size $0.04 + 0.001$ inch shall be used for Type I and $0.036 + 0.001$ inch shall be used for Type VI.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of material is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Department or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

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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 clothing where a high degree of wind resistance and water resistance is of prime importance.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Type of cloth required (see 1.2).
- c. ASSIST will be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2).
- d. When first article is required (see 3.1, 4.2 and 6.3)
- e. Color of cloth required (see 3.4).
- f. Width of cloth required (see 3.6.1).
- g. Length required if other than specified (see 3.12).
- h. Packaging (see 5.1).

6.3 First article. When a first article is required, it will be inspected and approved under the appropriate provisions of FAR 52.209-4. 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 include specific instructions in acquisition documents regarding arrangements for selection, inspection, and approval of the first article. (See 3.1 and 4.2).

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

6.5 Fabric defect scales. Replica Kits are available from SEARS ROEBUCK AND CO., 333 Beverly Road, Hoffman Estates, IL 60179 Dept. 871HG, FC 568B. For information call (847) 286-8952.

6.6 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issues, due to the extensiveness of the changes.

6.7 Subject term (key word) listing.

Binding Interlining
Lining
Shell, Outer

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Custodians:

Army – GL
Navy - NU
Air Force – 99

Preparing activity:
DLA-CT

Project No. 8305-0847

Review activities:

Army - MD
Navy – MC

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using ASSIST Online database at <http://assist.daps.dla.mil>.