

**INCH-POUND**

MIL-C-87052B

14 May 1990

**SUPERSEDING**

MIL-C-87052A

13 September 1983

## MILITARY SPECIFICATION

### CLOTH, TWILL, POLYESTER, WHITE

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 one type of twill cloth made from 100% texturized polyester.

#### 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 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 (see 6.2).

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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 01760-2490 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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AMSC N/A

FSC 8305

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SPECIFICATIONS

FEDERAL

- \* PPP-P-1133 - Packaging of Synthetic Fiber 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
- \* MIL-STD-2073-1 - DoD Materials Procedures Development and Application of Packaging Requirements
- \* MIL-STD-2073-2 - Packaging Requirement Codes

\* (Unless otherwise indicated, copies of federal and military specification, 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.

Rules and Regulations Under the Textile Fiber Products Identification Act

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

\* 2.2 Non-Government publications. The following document(s) form a part of this specification to the extent specified herein. Unless otherwise specified, the issue of documents which are DoD adopted shall be 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).

TECHNICAL MANUAL OF THE AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

AATCC 61-1989 Colorfastness to Laundering, Home and Commercial: Accelerated  
AATCC 130-1981 Soil Release: Oily Stain Release Method

(Application of copies should be addressed to AATCC National Headquarters, P.O. Box 12215, Research Triangle Park, NC 27709-2215.)

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(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.)

\* 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 takes precedence. Nothing in this document, however, supersedes 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 6.4). The standard sample is identified under piece number 89233. Variations from this specification may appear in the sample in which case this specification shall govern.

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 polyethylene glycol terephthalate, regular tenacity, semi-dull (see 4.4.1).

3.3.2 Yarn. The yarn used in both the warp and filling shall be made by plying two ends of 150 denier octalobal cross section, 33 (+ 3) filaments per end polyester and shall be texturized by the false twist process. All yarns shall contain the same number of filaments (see 4.4.1).

3.4 Color. Unless otherwise specified the color of the finished cloth shall be white 3006 and shall match the standard sample. The white cloth shall be fully bleached and supplemented with a blue violet fluorescing optical brightener. All cloth within any one contract shall be processed for whiteness in the same manner.

\* 3.4.1 Matching. The color and appearance of the dyed and finished cloth shall match the standard sample when viewed under filtered tungsten lamps 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.

\* 3.4.2 Discoloration. The finished cloth shall show fastness to light, laundering, combined laundering and bleaching, wet-dry cleaning and perspiration 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 combined laundering and bleaching, light, laundering, wet-dry cleaning and perspiration. Testing shall be as specified in 4.5.

3.5 Physical Requirements. The finished cloth shall conform to the requirements specified in Table I when tested as specified in 4.5.

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Table I - Physical Requirements

Characteristic	Requirements
Weight	
oz/sq yd	6.7 (+ 0.5)
(g/m)	(227.1 ± 17)
Yarns per inch (2.5cm) - minimum	
Warp	67
Filling	57
Breaking Strength	
lbs (N) (min)	
Warp	200(890)
Filling	150(668)
Tearing Strength	
lbs (N) (min)	
Warp	12 (53)
Filling	12 (53)

3.5.1 Weave. The weave shall be a  $\frac{2}{1}$  right hand twill.

\* 3.5.2 Width. Unless otherwise specified (see 6.2) the width of the cloth shall be the minimum of 60 inches (1.5m) inclusive of selvages, when fly shuttle looms or shuttless with tuck-in selvage looms are used. For all other shuttless looms the width measurement shall be made between the last yarn on each side excluding the protruding fringe.

\* 3.6 Finish. The cloth shall be scoured, heat set, dyed and given an approved soil release finish (see 6.5 and when tested as specified in 4.5). Percent add-on of the soil release finish shall be in accordance with the manufacturer's instructions. The character of the finished cloth shall be equal to that of the standard sample.

3.7 Non-fibrous materials. The starch and protein content including chloroform-soluble and water-soluble material of the cloth shall not exceed 3.0 percent when tested as specified in 4.5.

\* 3.8 Dimensional stability. The finished cloth shall not shrink or elongate more than 3.0 percent in warp and 2.0 in the filling when tested as specified in 4.5.

3.9 pH. The pH value of the water extract of the finished cloth shall be no less than 5.0 nor more than 8.5 when tested as specified in 4.5.

3.10 Length and put-up. Unless otherwise specified (see 6.2), the finished cloth shall be furnished in continuous lengths each not less than 40 yards (36.6m). Each length shall be put-up on rolls as specified in PPP-P-1133.

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

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

3.13 Workmanship. The finished cloth shall conform to the quality established by this specification. The demerit points per 100 square yards (83.6m<sup>2</sup>) 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 (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 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 ensure 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 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 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 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, 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 and tested in accordance with paragraph 4.5 and Table II.

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

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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. In addition, a certificate of compliance shall be submitted for the material requirements of 3.3.1 and 3.3.2.

4.4.2 Examination of the end item. Examination of the end item shall be in accordance with 4.4.2.1 through 4.4.2.5.

4.4.2.1 Yard-by-yard examination. Each roll in the sample shall be examined on face side only. When the total yardage in the roll does not exceed 100 yards (91.4m), the entire yardage in the roll shall be examined. When the total yardage in the roll exceeds 100 yards (91.4m) only 100 yards (91.4m) shall be examined. All defects as defined in Section III of FED-STD-4, which are clearly noticeable at normal inspection distance (3 feet) (0.91m) shall be scored and assigned demerit points as listed in 4.4.2.1.1, except that only those knots which exceed the limits shown on Sears Fabric Defect Scale (see 6.4), "C" knots shall be scored. No linear yard (increments of 1 yard (0.91m) on the measuring device of the inspection machine) from any one roll within the sample shall be penalized more than 4 points. The sample size shall be 20 rolls selected from 20 containers. The lot shall be unacceptable if the points per 100 square yards ( $83.6\text{m}^2$ ), of the total yardage examined exceeds 25 points; The lot shall be unacceptable if the point per 100 square yards ( $83.6\text{m}^2$ ) of two or more individual rolls exceeds 38 points. If one roll exceeds the point level per 100 square yards ( $83.6\text{m}^2$ ) a second sample of 20 rolls shall be examined only for individual roll quality examination. The lot shall be unacceptable if one or more rolls in the second sample exceeds 38 points per 100 square yards ( $83.6\text{m}^2$ ). Point computation for lot quality and individual roll quality shall be as follows:

$$\frac{\text{Total points scored in sample} \times 3600}{\text{Contracted width of cloth (inches)} \times \text{total yards inspected}} = \frac{\text{Points/100 square yds}}{(\text{83.6m}^2)}$$

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

For defects 3 inches (7.6cm) or less in any direction	-	one point
For defects exceeding 3 inches (7.6cm), but not exceeding 6 inches (15.2cm) in any direction	-	two points
For defects exceeding 6 inches (15.2cm), but not exceeding 9 inches (22.9cm) in any direction	-	three points
For defects exceeding 9 inches (22.9cm) in any direction	-	four points

The following defects, when present, shall be scored 4 points for each yard (0.91m) in which they occur:

- Baggy, ridgy or wavy cloth
- Width less than specified
- Characteristics of finish, hand and shade not equal to the standard sample
- Non uniformity of shade (mottled, streaky or cloudy)
- Holes, cuts, tears, open places

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4.4.2.2 Examination of length.

4.4.2.2.1 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 (1.82m) less than the length marked on 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.

4.4.2.2.2 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. The rolls examined shall be those selected for the examination of individual rolls.

4.4.2.3 Examination for shade variation. During the yard-by-yard examination, each roll in the sample shall be examined for shade variation. Any roll in the sample exhibiting uneven shade, shade variation side to side, side to center, or end to end, shall be cause for rejection of the entire lot represented by the sample.

4.4.2.4 Examination for shade match and finish, individual rolls. Each roll in the lot shall be examined visually for shade match (see 3.4.1) and finish (see 3.6). A roll shall be unacceptable if it fails to meet the requirements for shade match or finish. The sample unit shall be a 4 inch by 20 inch (10.2 by 50.8cm) swatch of the cloth. A sample unit shall be drawn from each roll in the lot.

4.4.2.5 Examination for face identification and non-conformance with the Textile Fiber Products Identification Act. During the yard-by-yard examination, each roll in the sample shall be examined for these defects. The lot shall be unacceptable if two or more rolls in the sample have face identification missing from either or both ends, or are not labeled or ticketed in accordance with the Textile Fiber Products Identification Act.

4.4.3 Examination of packaging requirements. An examination shall be made in accordance with the provision of PPP-P-1133 to determine that packaging, packing and marking comply with Section 5 requirements of this specification.

4.5 Testing of the end item. The methods of testing specified in FED-STD-191A, wherever applicable and as listed in Table II shall be followed. The physical and chemical values specified in Section 3, except where otherwise indicated, apply to the results 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 utilized in expressing the final result. The sample unit shall be 2 yards (1.82m), full width of the finished cloth. The sample size shall be as follows and the lot shall be unacceptable if one or more sample units fail to meet any requirements specified.

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



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Table II - Test Methods

Characteristic	Requirement Paragraph	Test Method
Discoloration to:		
Light	3.4.2	5660
Combined laundering and bleaching	3.4.2	5605 1/
*Laundering	3.4.2	5610 2/
Perspiration	3.4.2	5680
Wet-dry cleaning	3.4.2	5622
Weight	3.5	5041
Yarns per inch:		
Warp	3.5	5050
Filling	3.5	5050
Breaking strength:		
Warp	3.5	5100
Filling	3.5	5100
Tearing strength:		
Warp	3.8	5132
Filling	3.8	5132
Dimensional stability		
*Warp	3.8	5556 3/
*Filling	3.8	5556 3/
Nonfibrous material content	3.7	2611
pH	3.11	2811
*Soil release	3.6	4.6

1/ Only the stain on the polyester fibers of the transfer cloth shall be evaluated.

2/ Three cycles of TM 5610 shall be performed. The specimen shall be dried after each cycle.

3/ TM 5556 shall be followed, except that the following temperatures shall be used for each cycle:

CYCLE	TEMPERATURE DEGREE F (DEGREE C)	TIME (MIN)
1 Suds	120 degrees F (48.9 degree C)	5
2 Suds	160 degrees F (71.1 degree C)	5
3 Rinse	160 degrees F (71.1 degree C)	3
4 Rinse	140 degrees F (60.0 degree C)	3
5 Rinse	120 degrees F (48.9 degree C)	3
6 Rinse	100 degrees F (37.8 degree C)	3



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\* 4.6 Soil Release test procedure. The test method shall be in accordance with the requirements of 4.6.1 through 4.6.4.

\* 4.6.1 Specimens. There shall be three (3) 4x8 inch specimens taken from different warp and filling yarns.

\* 4.6.2 Staining. The test specimens shall be stained in accordance with AATCC TM 130-1981, except for the following:

- (1) The test specimen shall be 4x8 inches
- (2) Three drops of Graphite multi-grade motor oil (SAE 10W - 40)(see 6.8) supplied as GFM, shall be used in lieu of five drops of mineral oil.

\* 4.6.3 Laundrying. The test specimens shall be laundered in accordance with AATCC T.M. 61-1989, Test No. III A, except for the following:

- (1) The total liquor volume shall be 500ml.
- (2) 15 grams per liter of AATCC (124 WOB) detergent shall be used.
- (3) A total of 50 stainless steel balls shall be used.
- (4) No multifiber test fabric or bleached cotton fabric is required.
- (5) At the end of the cycle, rinse in running water at 105 degrees F. for five minutes, no scouring is required.
- (6) Hydroextract the test specimen to remove excess moisture. Air dry or oven dry at 220 degrees F.

\* 4.6.4 Evaluation. The test specimens shall be evaluated in accordance with AATCC T.M. 130-1981 procedure, except it shall be evaluated against "NCTRF Stain Release Replica" supplied as GFM (see 6.8). Test specimens shall have an average soil release rating of not less than 3.0 when tested as specified.

## 5. PACKAGING

\* 5.1 Preservation. Preservation shall be level A or C as specified (see 6.2).

5.1.1 Levels A or C. The cloth, put-up and packaged in accordance with the applicable requirements of PPP-P-1133.

5.2 Packing. Packing shall be level A, B or C (see 6.2).

5.2.1 Levels A, B and C. The cloth shall be packed in accordance with the 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 PPP-P-1133.

5.4 MIL-STD-2073. When specified (see 6.2), Preservation and Packing shall be in accordance with MIL-STD-2073-1 and MIL-STD-2073-2.

## 6. NOTES

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

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6.1 Intended use. The cloth covered by this specification is intended for use in clothing items worn by Navy personnel.

\* 6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification
- b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1)
- c. When first article sample is required (see 3.2). The item will be tested and should be a first article sample. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examination, quality, testing and approval of the first article.
- d. Color, if other than specified (see 3.4).
- e. Minimum width required, if other than specified (see 3.5.2)
- f. Length required (see 3.10)
- g. Levels of packaging and packing required (see 5.1 and 5.2)
- h. When all packaging data is to be found in MIL-STD-2073-1 and MIL-STD-2073-2 (see 5.4).

6.3 Samples and patterns. For access to samples and patterns, address the procuring activity issuing the invitation for bids (see 3.1 and 3.5).

6.4 Sears Fabric Defect Scales are available from Sears Roebuck and Company, Department 817 (ATTN: BSC 23-29), Sears Tower, Chicago, IL 60684.

6.5 The following Soil Release Agents are approved by the Navy Clothing and Textile Research Facility, Natick, MA 01760 for use and are based on extensive tests, including those for human toxicity. Because of the time necessary to conduct full evaluation, only those treatments listed below shall be considered acceptable for the related procurements.

<u>Compound</u>	<u>Company</u>
Zelcon 4951	E.I. DuPont de Nemours & Co. Wilmington, DE 19898
FC-258	Minnesota Mining & Mfg. Co. St. Paul, MN
Milease HPA	ICI Americas, Inc. Wilmington, DE 19897

\* 6.6 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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\* 6.7 Government furnished material (GFM). The ARCO Graphic multi-grade motor oil (see 4.6.2) and the NCTRF Stain Release Replica (see 4.6.4) are available after award of contract from the procuring office issuing the invitation for bids.

\* 6.8 Subject term (key word) listing.

Clothing, dress

Fabric, CNT

Uniforms, CNT

Custodian:

Navy - NU

Preparing activity:

Navy - NU

Review activity:

DLA - CT

Project 8305-N342

**STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL***(See Instructions - Reverse Side)***1. DOCUMENT NUMBER**  
MIL-C-87052B**2. DOCUMENT TITLE**  
CLOTH, TWILL, POLYESTER, WHITE**3a. NAME OF SUBMITTING ORGANIZATION****4. TYPE OF ORGANIZATION (Mark one)**☐

VENDOR

☐

USER

☐

MANUFACTURER

☐

OTHER (Specify): \_\_\_\_\_

**b. ADDRESS (Street, City, State, ZIP Code)****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)**