|INCH-POUND|

MIL-C-87064B(NU)
19 May 1992
SUPERSEDING
MIL-C-87064A
26 April 1985

MILITARY SPECIFICATION

CLOTH, DENIM, COTTON/POLYESTER

This specification is approved for use by the Navy Clothing and Textile Research Facility, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the requirements for 65% cotton and 35% polyester denim cloth.

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).

SPECIFICATIONS

FEDERAL

A-A-50199 - Thread, Polyester Core, Cotton- or Polyester -Covered

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, P.O. Box 59, Natick, MA 01760-0001 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 8305

STANDARDS

FEDERAL

FED-STD-4 - Glossary of Fabric Imperfections
FED-STD-191 - Textile Test Methods
FED-STD-803 - Packaging of Cotton and Cotton-Synthetic Fiber Blend Fabrics (Excluding Duck Fabrics)

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-2073-1 - DOD Materials Procedures For Development and Application of Packaging Requirements
MIL-STD-2073-2 - Packaging Requirement Codes

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from Standardization Document 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 20580-0001).

* 2.2 Non-Government publications. The following document(s) form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the 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 issue of the documents cited in the solicitation (see 6.2).

TECHNICAL MANUAL OF THE AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

* Method No. 8 1988 Colorfastness to Crocking: AATCC Crockmeter Method
* Method No. 16 1982 Colorfastness to Light: General Method

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS

* D 1424-83 Test for Tear Resistance of Woven Fabrics by Falling-Pendulum (Elmendorf) Apparatus

(Application for copies should be address to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-1187.)

(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 sample for shade and shall be equal to or better than the standard sample with respect to all characteristics for which the standard sample is referenced (see 6.3). The standard sample is identified under piece no. 89066.

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. (see 6.5).

3.3.1 Yarns. The filling yarns shall be a blend of 50 (± 5%) polyester and the remainder cotton. The warp yarns shall be a blend of cotton and polyester in such a proportion so that the basic cloth without finishing materials shall analyze 64 (± 5%) cotton and the remainder polyester.

3.4 Color. The color shall be Navy Shade Blue 3371 and shall match the standard sample. The warp shall be indigo dyed. The filling yarn may be tinted.

* 3.4.1 Matching. The finished cloth shall match the standard sample when viewed under filtered tungsten lamps which 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 Colorfastness. The finished cloth shall show colorfastness to laundering, light (after 40 standard fading hours), crocking and perspiration equal to or better than the standard sample when tested as specified in 4.5. As a limit of acceptability or when no standard sample is available, the finished cloth shall show a minimum of "good" fastness to light (40 SFH), fair fastness to perspiration, a color change after laundering no greater than 2-3 on AATCC Gray Scale for color change and crocking no less than 3.0 dry and 1.5 wet when tested as specified in 4.5.

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

Table I - Physical Requirements

Weight oz/sq yd (g/m^2) (min)	Yarns per inch(2.54cm) (min)		Breaking Strength lbs (newtons)(min)		Tearing Strength lbs (newtons)(min)	
	Warp	Filling	Warp	Filling	Warp	Filling
10.0 (339.0)	68	42	170 (756.2)	80 (355.8)	10 (44.5)	5 (22.2)

3.6 Weave. The cloth shall be a 3-harness construction, 2 up and 1 down right-handed twill when tested as specified in 4.5.

3.7 Width. The width of the cloth shall be as specified (see 6.2), and shall be the minimum acceptable width inclusive of selvage when fly shuttle or shuttleless looms, with 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.

3.8 Nonfibrous materials. The starch and protein content including chloroform-soluble and water-soluble material, shall not exceed 12.0 percent when tested as specified in 4.5.

* 3.9 Dimensional stability. The finished cloth shall not shrink or elongate more than 3.0 percent in either direction of the warp or filling when tested as specified in 4.5. The preshrinking process used shall not be identified by name or trademark, either on the cloth or the ticket or package.

3.10 Seam efficiency. The finished cloth shall have a seam efficiency of not less than 80% when tested as specified in 4.5.

3.11 pH. The pH of the cloth shall not be lower than 5.5 nor more than 8.5 when tested as specified in 4.5.

3.12 Length and put-up. Unless otherwise specified (see 6.2), the cloth shall be in continuous lengths, each not less than 40 yards. Each length shall be put-up on full width rolls as specified in FED-STD-803 with the face inwards.

3.13 Fiber identification. Each piece shall be ticketed or labeled for fiber content in accordance with the Rules and Regulations under the Textile Fiber Products Identification Act (see 2.1.2).

3.14 Workmanship. The finished cloth shall conform to the quality established by this specification. The demerit points per 100 square yards ($83.6m^2$), 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 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.

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

4.4.1 Component and material inspection. In accordance with 4.1 above, components and materials shall be 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.

4.4.2 Examination of the end item. Examination of the end item shall be in accordance with 4.4.2.1 through 4.4.2.4.

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.m), 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 the slubs and knots which exceed the limits shown on Sears Fabric Defect Scale (see 6.4), "E" or 3 for slubs and "C" for 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 in accordance with the following:

Lot size (yards)	Sample size (rolls) 1/
3200 or less	8
3201 to 10,000	13
10,001 and over	20

1/ Only one roll shall be taken from any shipping container, unless the number of shipping containers in the lot are less than the number of rolls required for sampling, in which case, all shipping containers shall be sampled.

The lot shall be unacceptable if the points per 100 square yards ($83.6m^2$) of the total yardage examined exceeds 28 points. The lot shall be unacceptable if the individual points per 100 square yards ($83.6m^2$) of two or more individual rolls exceeds 40 points. If one roll exceeds the point level per 100 square yards ($83.6m^2$), a second sample, the same size as the final sample, 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 ($83.6m^2$). Point computation for lot quality and individual roll quality shall be as follows:

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

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

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

The following defects, when present in the yard-by-yard and overall examination, shall be scored four points for each yard (0.91m) in which they occur:

Baggy, ridgy or wavy cloth
Width of cloth 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

4.4.2.2 Examination for length.

4.4.2.2.1 Individual rolls. During the yard-by-yard and overall examination, each roll in the sample shall be examined for length. Any length found to be less than the minimum specified or more than two yards (1.8m) 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 in 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 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 identification of pre-shrinkage process and compliance with 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 contain identification of the preshrinkage process by name or trademark on the cloth or ticket, or are not labelled or ticketed in accordance with the Textile Fiber Products Identification Act.

4.4.2.5 Examination for shade sampling. Each lot shall be examined visually for shade match (see 3.4.1) in accordance with the table listed below and the provisions contained in the contract. The lot shall be unacceptable if one or more pieces fail to meet the requirement for shade. The sample unit shall be a 4 inch by 20 inch (10.2 by 50.8 cm) swatch of the cloth. The sample unit shall be drawn from each piece in the sample size:

Lot size	Piece to be Sampled
1 - 8 pieces	each piece
9 - 25 pieces	8 pieces
26 - 90 pieces	20 pieces
91 - 160 pieces	32 pieces
over 160 pieces	1 of 5 pieces

4.4.3 Examination of packaging requirements. An examination shall be made in accordance with the provisions of FED-STD-803 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-191, wherever applicable and as listed in Table II, shall be followed. The physical and chemical values specified in Section 3 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 result. The sample unit shall be 3 continuous yards (2.7 continuous meters) full width of the finished cloth. The sample size (number of sample units) shall be as shown in the table below. The lot size shall be expressed in units of 1 yard (0.91m). The lot shall be unacceptable if one or more sample units fail to meet any test requirement specified.

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

Table II - Test Methods

Characteristics	Requirement paragraph	Test Methods
Fiber content:		
Polyester (percent)	3.3.1	2100 and 4.5.1
Cotton (percent)	3.3.1	2100 and 4.5.1
Dyestuff identification	3.4	1/
Colorfastness to:		
Light (40 SFH)	3.4.2	5660 2/
Laundering	3.4.2	5610 3/
Crocking	3.4.2	AATCC 8-1988 4/
Perspiration	3.4.2	5680
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	3.5	ASTM D-1424-83
Filling	3.5	ASTM D-1424-83
Weave	3.6	Visual 5/
Non-fibrous material	3.8	2611
Dimensional stability	3.9	5550
Seam efficiency	3.10	5110 6/
pH	3.11	2811

1/ Unless otherwise specified, a Certificate of Compliance shall be submitted and will be acceptable for the stated requirements.

2/ The calibration of the fadeometer and the definition of AATCC Fading Units shall be according to AATCC Test Method 16-1982. Using the formula above, 16 to 22 AFU's are acceptable as 20 SFH's.

$$\text{AATCC Fading Units} = \frac{(\Delta E^{*}\ )\ (20)}{1.7}$$

Where (ΔE^{*}) is the color difference in CIELAB* units of color differernce.

3/ Staining of the color transfer cloth will not be evaluated.

4/ AATCC Chromatic Transference Scale will be used.

5/ One determination per sample unit and the results reported as "pass" or "fail".

6/ The needle size shall measure 0.044 inch (+ 0.001) across the blade of the eye. The thread shall be polyester core conforming with type I of A-A-50199, ticket no. 50 for the needle and ticket no. 70 for the looper.

4.5.1 Test for polyester fiber and cotton fiber content. The general procedures of test method 2100 shall be followed and the fiber content percentages shall be calculated as follows:

$$\frac{\text{Weight of dry residual fiber x 100}}{\text{Weight of dry desized specimen}} = \text{percent polyester}$$

100 - percent polyester = percent cotton

4.5.1.1 Report. Two specimens shall be tested from each sample unit and the average percent polyester and the average percent cotton of the two specimens shall be reported to the nearest 0.1 percent.

* 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 Level A and Commercial. The cloth shall be put-up and preserved in accordance with the applicable requirements of FED-STD-803.

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 FED-STD-803.

5.3 Marking. In addition to any special marking required by contract or order, shipments shall be marked in accordance with the applicable requirements of FED-STD-803.

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.)

6.1 Intended use. The cloth covered by this specification is intended for use in the manufacture of dungaree work trousers for Navy enlisted men and women.

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

a. Title, number and date of this document.
b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1 and 2.2).
c. When a first article is required (see 3.2 and 4.3). The item will be tested and should be a first article sample. The contracting officer should include specific instruction in acquisition documents regarding arrangements for examinations, quantity, testing, and approval of the first article.
d. Width required (see 3.7).
e. Length required if other than specified (see 3.11).
f. Levels of put-up and preservation, and packing (see 5.1 and 5.2).
g. When all packaging data is to be found in MIL-STD-2073-1 and MIL-STD-2073-2.

6.3 Standard sample. For access to standard sample, address the procuring office issuing the invitation for bids (see 3.1).

6.4 Sears Fabric Defect Scales are available from Sears, Roebuck and Company, Department 817, (Attn: 23-29), Sears Tower, Chicago, IL 60684 (see 4.4.2.1).

6.5 Recycled material. It is encouraged that recycled material be used when practical as long as it meets the requirements of this specification.

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.

* 6.7 Subject term (key word) listing.
Clothing, work
Fabric, blend
Fabric, dungaree
Fabric, work clothing

Custodian:
Navy - NU

Preparing Activity:
Navy - NU

Review Activity:
DLA - CT

Project No. 8305-N358

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1 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

I RECOMMEND A CHANGE:	1 DOCUMENT NUMBER MIL-C-87064B(NT)	2 DOCUMENT DATE (YYMMDD) 92 05 19

3 DOCUMENT TITLE
CLOTH, DENIM, COTTON/POLYESTER

4 NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible Attach extra sheets as needed)

REVISION

5 REASON FOR RECOMMENDATION

6 SUBMITTER

a NAME (Last, First, Middle Initial)	b ORGANIZATION	
CAULFIELD, LOUISE A.	NAVY CLOTHING AND TEXTILE RESEARCH FACILITY	
c ADDRESS (Include Zip Code) P.O. BOX 59 NATICK, MA 01760-0001	d TELEPHONE (Include Area Code) (1) Commercial (508)651-4119 (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD) 92 05 19

8 PREPARING ACTIVITY

a NAME	b TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON
c ADDRESS (Include Zip Code)	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