

MIL-C-87065A(NU)

13 February 1986

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SUPERSEDING

MIL-C-87065

26 January 1979

## MILITARY SPECIFICATION

## CLOTH, CHAMBRAY, POLYESTER AND COTTON

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 chambray cloth made of a 50% Polyester and a 50% Cotton blend.

## 2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. Unless otherwise specified, the following specifications, standards, and handbooks of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this specification to the extent specified.

## SPECIFICATIONS

## FEDERAL

PPP-P-1134 - Packaging and Packing of Cotton and Cotton-Synthetic  
Fiber-Blend Fabrics (Excluding Duck Fabrics)

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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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## MILITARY

MIL-T-43548 - Thread, Polyester, Cotton Covered and Rayon Covered

## STANDARDS

## FEDERAL

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

## MILITARY

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

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this specification to the extent specified herein.

## 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, DC 20580).

2.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

## 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. The standard sample is identified under piece number 81209 (see 6.3).

3.2 First article. When specified (see 4.3 and 6.2), the contractor shall furnish a sample for first article inspection and approval.

3.3 Material. (see 6.5).

3.3.1 Fibers

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3.3.1.1 Polyester fiber. The fiber shall be a polyethylene glycol terephthalate, when tested as specified in 4.5.

\* 3.3.1.2 Cotton. The cotton shall be carded or combed, when tested as specified in 4.5.

\* 3.3.2 Yarns. The yarns shall be an intimate blend of polyester and cotton, drawn and spun into single yarns for both warp and filling. The finished cloth shall contain 50  $\pm$  5 percent polyester and the remaining percentage cotton, based on the dry weight of the desized specimen. Tests shall be made as specified in 4.5.

3.4 Color. The color shall be Navy shade Blue 3372 and shall match the standard sample. The warp shall be dyed and the filling natural.

3.4.1 Sulfur content. The use of dyes and compounds containing elementary sulfur capable of oxidation to sulfuric acid is prohibited. The dyestuff shall be chosen and applied so that the dyed and finished cloth shall contain no more labile sulfur than shown by the standard sample when tested as specified in 4.5. When a standard sample is not available, the dyed cloth shall show no more than a slight trace of labile sulfur as defined in the test method specified in 4.5.

3.4.2 Matching. The color of the cloth shall match the standard sample under artificial daylight having a color temperature at 7000 ( $\pm$ 500) Kelvin and shall be a good approximation to the standard sample under incandescent lamplight at 2850 ( $\pm$ 100) Kelvin.

\* 3.4.3 Colorfastness. The finished cloth shall show colorfastness to light, perspiration, crocking, and laundering equal to or better than the standard sample when tested as specified in 4.5. When no standard sample is available or when the standard sample is not referenced for colorfastness, the finished cloth shall show "fair" colorfastness to light and "good" colorfastness to laundering, perspiration, and crocking when tested as specified in 4.5.

3.5 Weave. The weave shall be plain, when tested as specified in 4.5.

\* 3.6 Physical requirements. The finished cloth shall conform to the physical requirements shown in Table I when tested as specified in 4.5.

Table I - Physical Requirements

Characteristics	Requirements
Weight - oz/yd <sup>2</sup> (g/m <sup>2</sup> )	
Minimum	3.3 (111.87)
Yarns per inch (2.54cm) - minimum	
Warp	66
Filling	46
Breaking strength - lbs (Newtons) minimum	
Warp	65 (298.1)
Filling	40 (177.9)
Tearing strength - lbs (Newtons) minimum	
Warp	4.5 (20.0)
Filling	3 (13.3)

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\* 3.6.1 Width. The width of the cloth shall be as specified (see 6.2) and shall be the minimum acceptable width including selvages. When woven on shuttleless looms, the width measurement shall be made between the last warp yarn on each side with the protruding fringe(s) excluded.

3.7 Seam efficiency. The cloth shall have a seam efficiency of not less than 85 percent when tested as specified in 4.5.

\* 3.8 Dimensional stability. The finished cloth shall not shrink nor elongate more than 3.0% in either the warp or filling when tested as specified in 4.5. The pre-shrinking process used shall not be identified by name or by trademark, either on the cloth, ticket, or package.

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 Finish. The cloth shall be closely singed, desized, heat set and treated with a precured resin to provide a crease resistant finish and hand equal in characteristics to that of the standard sample.

3.11 Non-fibrous material. The cloth, shall show no more than 4.0 percent starch and protein content including chloroform-soluble and water-soluble material, when tested as specified in 4.5.

3.12 Length and put-up. Unless otherwise specified (see 6.2), the cloth shall be furnished in continuous lengths, each not less than 40 yards (36m). Each length shall be put-up in a roll as specified in PPP-P-1134.

3.13 Face identification. The face side of the cloth shall be identified by stamping "FACE" on that side of the cloth at each end of the piece and roll.

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

3.15 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 values.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements 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 assure supplies and services conform to prescribed requirements.

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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 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 (see 6.2), the first article of finished cloth submitted in accordance with 3.2 shall be visually inspected for appearance, color, and finish, and shall be tested in accordance with methods specified in 4.5.

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 (91.4m), only 100 yards (91.4m) shall be examined. All defects are 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" 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:

<u>Lot Size (yards)</u>	<u>Sample Size (rolls) 1/</u>
3200 or less	8
3201 thru 10,000	13
10,001 and over	20

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

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

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

For defects up to and including 3 inches (7.6cm) 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 (22.8cm) in any dimension	= three points
For defects exceeding 9 inches (22.8cm) in any dimension	= four points

NOTE: The following defects, when present, shall be scored 4 points in the yard by yard and overall examination, for each yard (0.9m) in which they occur:

Baggy, ridgy or wavy cloth  
 Width less than specified  
 Poor dye penetration, mottled, streaky or cloudy  
 Excessive neppiness  
 Objectionable odor  
 Holes, cuts, tears  
 Characteristics of finish, hand, and shade not equal to the standard sample

#### 4.4.2.2 Examination for length.

4.4.2.2.1 Individual rolls. During the yard-by-yard examination, and overall examinations, 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.

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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 examination, each roll in the sample shall be examined for shade variations. Any two rolls 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 face identification, non-identification of preshrinking process, and compliance with Textile Fiber Products Identification Act. 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 of the following defects are present in the sample:

Face identification missing from either or both ends  
 Face identification on wrong side  
 Preshrinkage process identified by name or trademark on cloth or ticket  
 Not labeled or ticketed in accordance with the Rules and Regulations under the Textile Fiber Products Identification Act

4.4.3 Examination of packaging requirements. An examination shall be made in accordance with the provisions of PPP-P-1134 to determine whether packaging, packing, and marking comply with section 5 requirements.

\* 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. The sample unit shall be 5 continuous yards (4.5m), full width of finished cloth. The sample 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. All test reports shall contain the individual values utilized in expressing the final results.

<u>Lot Size (yards)</u>	<u>Sample Size</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
Identification of polyester	3.3.1.1	1600 <u>1/</u>
Identification of cotton	3.3.1.2	1200 <u>1/</u>
Yarn:		
Polyester fiber content	3.3.2	2100, 4.5.1
Cotton fiber content	3.3.2	2100, 4.5.1
Presence of labile sulfur	3.4.1	2020
Colorfastness to:		
Laundering	3.4.3	5610 <u>3/</u>
Light	3.4.3	5660
Perspiration	3.4.3	5680
Crocking	3.4.3	5651
Weave	3.5	Visual <u>2/</u>
Weight	3.6	5041
Yarns per inch:		
Warp	3.6	5050
Filling	3.6	5050
Breaking strength:		
Warp	3.6	5100
Filling	3.6	5100
Tearing strength:		
Warp	3.6	5132
Filling	3.6	5132
Seam efficiency	3.7	5110 <u>4/</u>
Dimensional stability	3.8	5556 <u>5/</u>
pH	3.9	2811
Finish	3.10	<u>1/</u>
Nonfibrous material	3.11	2611

- 1/ Unless otherwise specified, a certificate of compliance shall be submitted and will be acceptable for the stated requirement.
- 2/ One determination for each sample unit and the result reported as "pass" or "fail".
- 3/ Only the stain of the cotton and polyester fiber shall be rated when evaluating the color transfer cloth.
- 4/ The needle size shall measure 0.036 (+0.001) inch across the blade at the eye. The thread shall be polyester covered in accordance with MIL-T-43548, ticket #70, 2 ply for needle and looper
- 5/ Cotton procedure shall be used.

4.5.1 Fiber content. The general procedure of method 2100 shall be followed and the fiber content percentages calculated as follows:

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

$$100 - \text{percent polyester} = \text{percent cotton}$$



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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 reported to the nearest 1.0 percent.

## 5. PACKAGING

5.1 Preservation-packaging. Preservation-packaging shall be level A or C as specified (see 6.2).

5.1.1 Level A or C. The cloth, put up as specified (see 3.12), shall be packaged in accordance with the applicable requirements of PPP-P-1134.

5.2 Packing. Packing shall be level A, B, or C as specified (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-1134.

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

## 6. NOTES

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

6.2 Ordering data. Procurement documents should specify the following:

- a. Title, number, and date of this specification.
- b. 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 examinations, quantity, and testing and approval of the first article.
- c. Width required (see 3.6.1).
- d. Minimum and maximum lengths for cloth (see 3.12).
- e. Levels of packaging and packing required (see 5.1 and 5.2).

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

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

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\* 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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Review Activity:  
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Project No. 8305-N076

**STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL***(See Instructions - Reverse Side)*

1. DOCUMENT NUMBER MIL-C-87065A(NU)		2. DOCUMENT TITLE CLOTH, CHAMBRAY, POLYESTER AND COTTON	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one)  <input type="checkbox"/> VENDOR  <input type="checkbox"/> USER  <input type="checkbox"/> MANUFACTURER  <input type="checkbox"/> OTHER (Specify): _____	
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b. Recommended Wording:			
c. Reason/Rationale for Recommendation:			
6. REMARKS			
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