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FEDERAL SPECIFICATION

CLOTH, BUCKRAM, WOVEN AND NONWOVEN

This specification was approved by the Assistant Administrator, Office of Federal Supply and Services, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers the requirements for woven and nonwoven buckram.

1.2 Classification.

1.2.1 Types and classes. The finished cloth shall be of the following types and classes, as specified (see 6.2).

Type I - Resin finish.

Class 1 - 5.7 ounces per square yard (fine texture).

Class 2 - 5.7 ounces per square yard (medium texture).

Type II - Non-chlorine retentive resin finish.

Class 1 - 4.5 ounces per square yard.

Type III - Starch finish.

Class 1 - 3.8 ounces per square yard.

Class 2 - 12.0 ounces per square yard.

Type IV - Nonwoven.

Class 1 - 3.3 ounces per square yard.

2. APPLICABLE DOCUMENTS

2.1. The following documents, of the issues in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

FSC 8305

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Federal Specification:

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

Federal Standards:

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

(Activities outside the Federal Government may obtain copies of Federal specifications, standards, and commercial item descriptions as outlined under General Information in the Index of Federal Specifications, Standards and Commercial Item Descriptions. The Index, which includes cumulative bimonthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification, and other Federal specifications and commercial item descriptions required by activities outside the Federal Government for bidding purposes are available without charge from General Services Administration Business Service Centers in Boston, MA; New York, NY; Philadelphia, PA; Washington, DC; Atlanta, GA; Chicago, IL; Kansas City, MO; Fort Worth, TX; Houston, TX; Denver, CO; San Francisco, CA; Los Angeles, CA; and Seattle, WA.

(Federal Government activities may obtain copies of Federal standardization documents and the Index of Federal Specifications, Standards and Commercial Item Descriptions from established distribution points in their agencies.)

Military Standard:

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

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

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.)

3. REQUIREMENTS

3.1 Standard sample. When a standard sample is available, 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).

3.2 Material (see 6.6).

3.2.1 Yarn. The yarn for types I, II, and III shall be made from cotton which has been carded, drawn and spun into singles yarn for both warp and filling.

3.2.2 Fibers, nonwoven (type IV). The fibers for the nonwoven cloth shall be all polyester or a blend of polyester and cellulose. The fiber content in the finished cloth shall consist of $85 + 5$ percent polyester with the remaining percent being cellulose, or it shall be 100 percent polyester when tested as specified in 4.2.3.

3.2.2.1 Web. The randomly oriented web shall be saturation bonded with an acrylic type binder.

3.3 Color. The color shall be natural, bleached or dyed as specified, (see 6.2). When natural is specified, the cloth shall be fabricated from unbleached yarn. The use of reused or dyed fiber shall be allowed, subject to the colorfastness requirements specified in 3.3.2. The use of dyes or substances containing elementary sulfur compounds capable of oxidation to sulfuric acid is prohibited. The dyestuff shall be chosen and applied so that the dyed 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 cloth shall show no more than a slight trace of labile sulfur as defined in the test method specified in 4.2.3.

3.3.1 Matching. The color of the dyed cloth shall match the available standard sample under artificial daylight having a 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.

3.3.2.1 Natural cloth. When dyed fibers are utilized (see 3.3), the finished cloth shall show colorfastness to laundering, perspiration, and wet drycleaning equal to or better than the standard sample. When the standard sample is not established for colorfastness, the natural and finished cloth (when composed of dyed fibers) shall show "good" colorfastness to laundering, perspiration, and wet drycleaning when tested as specified in 4.2.3.

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3.3.2.2 Dyed cloth. The dyed and finished cloth shall show colorfastness to ~~laundry~~ laundering, crocking, perspiration, and wet drycleaning equal to or better than the standard sample (see 6.3). When the standard sample is not established for colorfastness, the dyed and finished cloth shall show "good" colorfastness to laundering, perspiration, and wet drycleaning and shall show a Munsell Value for crocking not lower than 8.5. Tests shall be as specified in 4.2.3.

3.4 Design and construction.

3.4.1 Physical requirements. The finished cloth shall conform to the requirements shown in tables I and II when tested as specified in 4.2.3.

TABLE I. Physical requirements - woven

Type Class	Weight per sq yd ozs		Yarns per inch minimum				Breaking strength (pounds)				Stiffness (inch pounds)				Shrinkage (percent)		Non-fibrous materials maximum	
	Min	Max	Warp	Filling		Warp	Filling		Warp	Filling		Warp	Filling		Maximum	Filling	Percent	
				Min	Max		Min	Max		Min	Max		Min	Max				
I	5.7	6.8	52	44	63	54	0.020	0.030	0.010	0.020	3.0	2.0	--	--				
	5.7	7.4	43	22	80	54	0.025	0.040	0.013	0.030	3.0	3.0	--	--				
II	4.5		50	42	60	50	--	--	--	--	1.0	1.0	60					
III	3.8		46	42	50	40	--	--	--	--	--	--	35					
	12.0		48	20	140	125	--	--	--	--	--	--	50					

TABLE II. Physical requirements - nonwoven

Type Class	Weight per sq yd (ounces)		Breaking strength, pounds (minimum)				Stiffness (Inch pounds)				Shrinkage (percent)	
	Min	Max	After		Initial laundering		MD		CD		Maximum	CD
			MD	CD	MD	CD	Min	Max	Min	Max		
IV	3.3	4.1	55	38	41	28	0.008	0.024	0.005	0.017	2.5	2.5

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3.4.2 Woven cloth. The weave for the woven fabric shall be plain, except that type III, class 2 cloth shall be a herringbone twill.

3.4.3 Nonwoven cloth. The nonwoven cloth shall be formed by the wet-laid or wet process. The fibers shall be randomly oriented and bonded together with a cross linked acrylic type binder.

3.4.4 Width. The width of the cloth shall be as specified (see 6.2) and shall be the minimum acceptable width inclusive of selvages for woven cloth.

3.5 Finish.

3.5.1 Type I. Type I cloth shall have an approved resin finish (see 6.4) which will provide fabric stiffness as required in table I.

3.5.2 Type II. Type II cloth shall have a non-chlorine retentive approved resin finish (see 6.4) and the material shall show no discoloration or loss of more than 10 percent of the original breaking strength of the cloth, when tested as specified in 4.2.3. The total nonfibrous materials including resins, plasticizers and other substances shall not exceed the amounts specified in table I when tested as specified in 4.2.3.

3.5.3 Type III. Type III, class 1 cloth shall have a starch swing finish. Determination of the swing finish shall be made as specified in 4.2.3. Type III, class 2 cloth shall have a starch finish. The starch and protein content, including chloroform-soluble and water-soluble material for type III cloth, shall not exceed the amounts specified in table I when tested as specified in 4.2.3.

3.5.4 Type IV. The type IV finished cloth shall contain 64 ± 4 percent fiber and 36 ± 4 percent binder by weight. The contractor shall finish a certificate of compliance for this requirement when tested as specified in 4.2.3.

3.6 pH (types I, II and III). The pH value of the water extract of the finished cloth shall be not less than 5.5 nor more than 8.5 when tested as specified in 4.2.3.

3.7 Shrinkage (types I, II and IV). The finished cloth for types I, II and IV shall conform to the shrinkage requirements in tables I and II when tested as specified in 4.2.3. The preshrinkage processes used shall not be identified by name or trademark, either on the cloth, ticket, or package.

3.8 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 in rolls as specified in PPP-P-1134.

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

3.10 Workmanship. The finished cloth shall conform to the quality of product established by this specification. The occurrence of defects shall not exceed the applicable acceptable quality levels.

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 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 specification 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 otherwise 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 specifications, drawings, and standards unless otherwise excluded, amended, modified, or qualified in this specification or applicable purchase document.

4.2.2 End item examination.

4.2.2.1 Yard-by-yard examination. The required yardage of each roll shall be examined for the defects listed below. All defects which are clearly noticeable at normal inspection distance (3 feet) shall be counted regardless of their proximity to each other except that when two or more defects represent a single local condition of the cloth, only one shall be scored. A continuous defect shall be counted as one defect for each yard or fraction thereof in which it occurs. The sample unit shall be 1 linear yard. The lot size unit shall be 1 yard. The inspection level shall be I and the acceptable quality level, expressed in terms of defects per hundred units, shall be 4.0 The number of rolls from which the sample is to be selected shall be in accordance with table III. An approximately equal number of yards shall be examined from each roll in the sample.

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Defects

Hole, cut, or tear

Smash

Knots 1/

Grease or oil stain

Embedded crease or wrinkle

Two or more ends out for more than 9 inches

Lumps (type IV)

Abrasion or rub mark resulting in damage to fiber (type IV)

1/ To be scored only when larger than limits shown on figure 1 of FED-STD-4.

4.2.2.2 Overall examination. Each roll selected for yard-by-yard examination in accordance with table III shall be examined over its entire length for the defects listed below. Each defect shall be counted not more than once in each roll examined. If the total number of defects in the sample rolls exceeds the maximum number specified in table III, the lot shall be rejected.

DefectsWidth less than specified 1/

Overall uncleanness

1/ Shall not be scored unless it occurs for more than 5 yards per roll.TABLE III. Examination criteria

Lot size (yards)	Sample size (rolls)	Maximum number of defects acceptable in sample <u>1/</u>
Up to and including 3200	3	0
3201 up to and including 10,000	5	0
10,001 up to and including 35,000	8	1
35,001 up to and including 150,000	13	2
150,001 and over	20	3

1/ This column is applicable to 4.2.2.2.

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4.2.2.3 Length examination.

4.2.2.3.1 Individual rolls. Each roll selected for yard-by-yard examination in accordance with table III 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. If the total number of defects in the sample rolls exceeds one, the lot shall be rejected.

4.2.2.4 Shade examination. During the yard-by-yard examination, each roll in the sample shall be examined for shade. Any roll in the sample off shade or shaded side to side, side to center, or end to end shall be cause for rejection of the lot.

4.2.2.5 Examination for identification of preshrinkage process and for noncompliance with the Textile Fiber Products Identification Act. During the yard-by-yard examination, each roll in the sample shall be examined. The lot shall be rejected 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 labeled or ticketed in accordance with the Textile Fiber Products Identification Act.

4.2.3 End item testing. The methods of testing specified in FED-STD-191 wherever applicable, and as listed in table IV 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. The sample unit shall be as follows:

- a. Four yards, full width of the finished cloth, for type II, class 1.
- b. Three yards, full width of the finished cloth, for type I, classes 1 and 2.
- c. One and one-half yards, full width of the finished cloth, for type III.
- d. Three yards, full width of the finished cloth, for type IV, class 1.

The sample size shall be as follows:

<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

The lot shall be unacceptable if one or more sample units fail to meet any requirement specified. All test reports shall contain the individual values utilized in expressing the final result.

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TABLE IV. End item tests

Characteristic	Requirement paragraph	Test method
Material:		
Cotton (types I, II and III)	3.2.1	1200 <u>1/</u>
Polyester (type IV)	3.2.2	1600 <u>1/</u>
Weight	3.4.1	5041
Yarns per inch:		
Warp	3.4.1	5050
Filling	3.4.1	5050
Breaking strength:		
Warp	3.4.1	5100
Filling	3.4.1	5100
Weave	3.4.2	Visual <u>2/</u>
Swing finish (type III, class 1)	3.5.3	4.3.1 <u>2/</u>
Chlorine degradation (type II)	3.5.2	4.3.2
Discoloration (type II)	3.5.2	4.3.3
Stiffness	3.4.1	5202
Finish (type IV)	3.5.4	<u>1/</u>
Colorfastness to:		
Laundrying	3.3.2	5610 <u>3/</u>
Wet drycleaning	3.3.2	5622
Crocking	3.3.2	5651
Perspiration	3.3.2	5680
Labile sulfur content	3.3	2020
Nonfibrous materials:		
Type II	3.4.1 and 3.5.2	<u>2/</u>
Type III	3.4.1 and 3.5.3	2611 <u>1/</u>
Shrinkage in laundering		
(types I, II and IV)	3.4.1 and 3.7	<u>4/</u>
pH	3.6	2811

- 1/ Unless otherwise specified, a certificate of compliance is required and will be acceptable for the requirements specified.
- 2/ One determination shall be made from each sample unit and the results reported as "pass" or "fail".
- 3/ On the color transfer cloth evaluation, only the stain on the cotton fibers of the color transfer cloth shall be evaluated.
- 4/ Specimen preparation and shrinkage evaluation shall be in accordance with Method 5556 of FED-STD-191. The laundrying test procedure shall be as specified in 4.3.4.

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

4.3 Methods of inspection.

4.3.1 Swing finish test. A piece of type III, class 1 cloth, 10 by 10 inches shall be folded on a 45° bias without creasing. Hold the ends of the fold with both hands and pull on both ends of the cloth. Cloth having a swing finish will stretch or buckle.

4.3.2 Chlorine degradation test (type II). A piece of cloth, not less than 48 inches long and full width, shall be laundered in accordance with Method 5550 of FED-STD-191 and shall then be treated for 1 hour with 0.7 percent available chlorine solution with a temperature of $25 \pm 1^\circ\text{C}$. The piece shall be rinsed in a sour solution of 0.014 percent acetic acid (0.05 mL of 28 percent acetic acid per 100 mL of water) for 1 minute at $80 \pm 5^\circ\text{F}$ ($27 \pm 3^\circ\text{C}$) and washed thoroughly until a control piece (undyed, desized, cotton cloth) shows no trace of chlorine. The piece shall be air-dried and then conditioned under Standard Conditions as defined in FED-STD-191. Eight pairs of specimens, four warpwise and four fillingwise, with each set having segments of the same yarns, shall be taken for tests. Four warp specimens and four filling specimens shall be tested in accordance with Method 5100 of FED-STD-191. The remaining warp and filling specimens shall be oven dried at 105 to 110°C for 2 hours and tested after conditioning, for breaking strength in the same manner as the initial test specimens. The difference in the average breaking strength of the respective warp and filling samples shall be computed and the percentage of loss determined.

4.3.3 Discoloration test (type II). A 4 by 4-inch piece of the chlorinated and conditioned sample of cloth from 4.3.2, with a piece of the unchlorinated cloth shall be oven dried at a temperature of 105 to 110°C for 2 hours. Both pieces shall be removed from the oven and allowed to cool at room temperature. The chlorinated piece shall then be compared with the control cloth for discoloration. Any discoloration shall be cause for rejection.

4.3.4 Laundering test procedure. The following apparatus and material are required for laundering:

- a. Automatic washing machine (see 6.5).
- b. Automatic dryer (see 6.5).
- c. AATCC Standard Detergent 125 or equivalent.
- d. Sufficient yardage to equal a 4-pound load.

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A 4-pound load shall be washed in a machine set for high water level, warm water temperature ($140 + 5^{\circ}\text{F}$), and a 12-minute wash on the wash and wear cycle. The water used shall have a hardness of not greater than 50 parts per million (PPM). When the washer has filled, add 140 g of detergent. Allow the washer to operate automatically through the final spin cycle. Remove the specimens immediately at the end of the final spin and separate the specimens if tangled. Place the complete washed load in the dryer and dry at a normal setting which generates an exhaust temperature of 140 to 160°F. Operate the dryer until the load is dry and continue tumbling for 5 minutes without heat (cool-down cycle). Remove the load immediately after the machine stops. Repeat the procedure until the load has completed five full cycles.

5. PREPARATION FOR DELIVERY

5.1 Packaging. Packaging shall be level A or C as specified (see 6.2).

5.1.1 Levels A and C. The cloth, put up as specified, 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, shipments shall be marked in accordance with the requirements of PPP-P-1134.

6. NOTES

6.1 Intended use. Types I, II and III cloth are used as interlining for clothing. Type II cloth is suitable for lining shirt collars. Type IV cloth is used as waistband, belt, hat and cap (sweatband and crown) interlining and as collar interlining for overcoats, coats and shirts.

6.1.1 Type I, class 1. Used in:

Air Force	-	Man's summer coat
Navy	-	Men's and women's uniforms
	-	Men's and women's overcoats (except pea coats)
Marine Corps	-	Coats and belts

6.1.2 Type I, class 2. Used in:

Air Force	-	Wool serge coat
Army	-	Man's and woman's coats
	-	Man's overcoat
Marine Corps	-	Man's overcoat
	-	Man's coat
	-	Woman's coat

6.2 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents.

- (a) Title, number, and date of this specification.
- (b) Type and class of cloth required (see 1.2.1).
- (c) Color of cloth required (see 3.3).
- (d) Width of cloth required (see 3.4.4).
- (e) When length is other than specified (see 3.8).
- (f) Selection of applicable levels of packaging and packing (see 5.1 and 5.2).

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

6.4 Resin treatment. Only those resin treatments already approved by the appropriate medical service and so listed in the invitation for bids or request for proposal shall be considered acceptable for the related procurement.

6.5 Recommended apparatus. The recommended laundering and dryer apparatus for 4.3.4 are as follows:

- a. Kenmore Automatic Washer Model 600 or similar machine. In case of dispute, the Kenmore Model 600 shall be used.
- b. Kenmore Automatic dryer Model 600 or equivalent.

6.6 Recycled material. It is encouraged that recycled material be used when practical as long as it meets the requirements of the specification (see 3.2).

6.7 For civil agency procurement. When level B packaging is specified for civil agency procurement, the requirements of 5.1.1, level A packaging shall apply (see 5.1).

MILITARY INTEREST:

Custodians

Army - GL
Navy - NU
Air Force - 11

Review Activities

Army - MD
Navy - MC
Air Force - 99

CIVIL AGENCY COORDINATING ACTIVITIES:

GSA - FSS
GPO

PREPARING ACTIVITY:

Army - GL

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