

MIL-C-2184F

5 November 1973

SUPERSEDING

MIL-C-2184E

5 May 1969

MILITARY SPECIFICATION

CLOTH, FLANNEL, WOOL, 10-1/2 OUNCE, SHRINK RESISTANT

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 This specification covers one type of wool flannel cloth.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

FEDERAL

PPP-P-1132 - Packaging and Packing of Woolen, Worsted and Wool Blend (Synthetic Fiber; Cotton) Fabrics.

MILITARY

MIL-C-43665 - Cloth Wool: Mothproofing Treatment Of.

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.

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

FSC 8305

MIL-C-2184F

PUBLICATIONS

U.S. Department of Agriculture

Methods of Test for Grades of Wool Top

(Application for copies should be addressed to the U.S. Department of Agriculture, Agricultural Marketing Service, Washington, D.C. 20402.)

Rules and Regulations Under The Wool Products Labeling Act of 1939

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.)

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).

3.2 Material.

3.2.1 Wool. The wool top shall be fleece wool, pulled wool or any combination thereof not lower in grade than 60's U. S. Standard. The use of noils, laps, or any other manufacturing by-products is prohibited.

3.2.2 Yarn. The yarn shall be spun from combed top on either the Bradford, French or American system. The yarn for both warp and filling shall be singles (see 4.4).

NOTE: Selvage yarn - To prevent edges of cloth from building up when rolled, the yarns used in the selvages may be of a finer count than the yarns used in the body of the cloth.

3.3 Color. The color of the finished cloth shall be as specified (see 6.2 and 6.4), and shall match the standard sample. The color shall be produced by blending top dyed wool.

3.3.1 Mothproofing. In the dyeing operation, the top shall be mothproofed in accordance with MIL-C-43665.

3.3.2 Matching. The color of the finished cloth shall match the standard sample under natural (north sky) daylight or artificial daylight having a color temperature of 7500° Kelvin, and shall be a good approximation to the standard sample under incandescent lamplight at 2800° Kelvin.

MIL-C-2184F

3.3.3 Colorfastness. The finished cloth shall show fastness to laundering, crocking, perspiration and light equal to or better than the standard sample. When no standard sample has been established or designated as applicable to colorfastness, the finished cloth shall show good fastness to laundering, perspiration and light, and shall show a Munsell Value for crocking not lower than 8.5. For Olive Green 108 the light exposure time for "good" fastness shall be 40 standard fading hours and for Air Force Blue 1084 shall be 80 standard fading hours. Test shall be made as specified in 4.4.

3.4 Physical requirements. The finished cloth shall conform to the requirements specified in table I when tested as specified in 4.4.

TABLE I. Physical requirements

Width exclusive of selvage (minimum) <u>(minimum)</u> <u>Inches</u>	Weight (based on linear yard of 56-inch)		Yarns per inch (minimum)		Breaking strength (minimum)		Weave
	<u>(minimum)</u>	<u>(maximum)</u>	Warp	Filling	Warp <u>Pounds</u>	Filling <u>Pounds</u>	
	<u>Ounces</u>	<u>Ounces</u>					
60	10.5	12.6	68	68	55	55	2/2 Twill to the right

3.5 Finish. The cloth shall be scoured, sheared and pressed. The finished cloth shall have the same degree of character and finish as shown by the standard sample.

- * 3.5.1 Shrink resistant treatment. The cloth shall be given a shrinkage control treatment for resistance to felting shrinkage by an approved shrink resistant process (see 6.5). The relaxation shrinkage of the treated cloth shall not exceed 5.0 percent in the warp and 4.0 percent in the filling when tested as specified in 4.4. The felting shrinkage of the treated cloth shall not exceed 4.0 percent in the warp and 3.0 percent in the filling when tested as specified in 4.4.
- * 3.5.1.1 Stiffness. When a resin or reactive treatment is used for producing shrink resistance, the stiffness of the treated cloth shall not be greater than 0.003 load pounds in the warp direction when tested as specified in 4.4.
- * 3.5.1.2 Alkali solubility. When an oxidation or oxidation/resin method of producing shrink resistance is used, the alkali solubility of the treated cloth shall not be increased more than 6.0 percent (absolute) over the untreated cloth when tested as specified in 4.4.

MIL-C-2184F

3.5.2 pH. The pH value of the water extract of the finished cloth shall be no less than 4.0 nor more than 8.0 when tested as specified in 4.4.

3.6 Length and put-up. Unless otherwise specified (see 6.2), the cloth shall be furnished in continuous lengths, each not less than 50 yards. Each length shall be put up in full width rolls as specified in PPP-P-1132.

3.7 Wool content. The finished cloth shall contain not less than 95 percent wool based on the dry weight of the specimen when tested as specified in 4.4.

3.8 Wool content label. Cloth manufactured under this specification shall be labeled in accordance with the Wool Products Labeling Act of 1939 (see 2.1).

3.9 Marking. The back of the cloth shall be marked "Back" at both ends of each roll with letters not less than 1/2 inch in height (see 4.2.2.3). The marking shall be clearly legible in any indelible marking medium used commercially.

- * 3.10 Workmanship. The finished cloth shall conform to the quality established by this specification. The demerit points per 100 square yards when calculated as specified in section 4 shall not exceed the established maximum point value. Each defect shall be marked with a 1 to 1-1/2 inch long string. The string shall be sewn into the selvage near the defect. A red string shall represent a three or four point defect and a white string shall represent a one or two point defect (see 4.2.2.1.1 and 4.2.2.5).

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier 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.

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

4.2.1 Component and material inspection. In accordance with 4.1 above, components and materials shall be inspected and 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 purchase document.

MIL-C-2184F

4.2.1.1 Wool. The wool shall be visually examined for grade (see 3.2.1) in top form by comparison with the applicable U. S. Standard (see 2.1). In the event of a dispute, the wool grade shall be determined by the width method (wedge). The sample unit shall be 1 yard of undyed top. The sample size (number of sample units) shall be as shown in the table below. The lot size shall be expressed in units of one pound. The results from each sample unit shall be reported separately. The lot shall be unacceptable if a single sample unit fails to meet the required grade.

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

4.2.1.2 In-process inspection. Inspection shall be made at any point or during any phase of the manufacturing process to assure that no laps, noils or any other wool manufacturing by-products are used (see 3.2.1) and that the dyeing requirements have been adhered to (see 3.3). The Government reserves the right to exclude from consideration for acceptance any material for which in-process inspection has indicated non-conformance.

4.2.2 Examination of the end item. Examination of the end item shall be in accordance with 4.2.2.1 through 4.2.2.4.

- * 4.2.2.1 Yard-by-yard examination. Each roll in the sample shall be examined on the face side. 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. 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 up to and including 10,000	13
10,001 and over	20

- 1/ No more than one roll shall be taken from any shipping container unless the number of shipping containers in the lot is less than the required number of rolls in which case all shipping containers shall be present in the sample.

All defects as defined in Section II of FED-STD-4, which are clearly noticeable at normal inspection distance (3 feet) shall be scored and assigned demerit points as listed in 4.2.2.1.1 except that only those knots and slubs which exceed the limits shown on Sears Fabric Defect Scales (see 6.6), D for

MIL-C-2184F

slubs and D for knots shall be scored. The same yardage shall be given a through-lighting inspection from the back of the cloth towards a light source for holes and thin areas not previously scored on the face side of the cloth. Slight open places resulting from removal of burrs, shives, sisal or broken picks not previously scored on the face side shall not be scored in through-lighting inspection. Defects on the selvage shall not be scored unless the body of the cloth is affected. No linear yard (increments of 1 yard on the measuring device of the inspection machine) from any one roll within the sample shall be penalized more than 4 points. The lot shall be unacceptable if the points per 100 square yards of the total yardage examined exceeds 10.0 points. The lot shall be unacceptable if the points per 100 square yards of two or more individual rolls exceeds 15.0 points. If one roll exceeds 15.0 points per 100 square yards, a second 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 15.0 points per 100 square yards. Point computation for lot quality and individual roll quality shall be as follows:

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

* 4.2.2.1.1 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:

Width less than specified

Edges or roll build-up, or softness of roll in body of cloth

4.2.2.2 Examination for length.

4.2.2.2.1 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 two yards 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.

4.2.2.2.2 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 roll tickets. The rolls examined shall be those selected for the examination of individual rolls.

4.2.2.3 Examination for back marking and compliance with the Wool Products Labeling 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:

Back stamping missing from either or both ends.
 Back stamping on wrong side.
 Letters less than 1/2 inch in height.
 Not labeled or ticketed in accordance with the Rules and Regulations Under the Wool Products Labeling Act.

4.2.2.4 Examination for shade and finish - individual rolls. Each roll in the lot shall be examined visually for shade match (see 3.3.2) and finish (see 3.5). A roll shall be unacceptable if it fails to meet the requirements for shade match and finish. The sample unit shall be a 4-inch by 20-inch swatch of the cloth. A sample unit shall be drawn from each roll in the lot.

- * 4.2.2.5 Examination for defect marking. During the yard by yard examination, each roll in the sample shall be examined for defect marking. Any roll having more than 2 three or four point fabric defects (red string) not strung or more than 5 fabric defects (red or white strings) not strung shall be classified as a defective roll in regard to the defect marking requirement (see 3.10). The lot shall be unacceptable if more than two rolls in the sample are defective in regard to the defect marking requirement or if there are more than 10 three or four point defects (red strings) not strung in the sample.

4.3 Examination of preparation for delivery requirements. An examination shall be made in accordance with the provisions of PPP-P-1132 to determine that packaging, packing and marking comply with the section 5 requirements.

- * 4.4 Tests. 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 1/4 yard of the untreated cloth and 3-1/2 continuous yards full width of the finished cloth. The lot shall be unacceptable if one or more sample units fail to meet any test requirement specified. The lot size shall be expressed in units of one yard. All test reports shall contain the individual values utilized in expressing the final result. The sample size (number of sample units) shall be in accordance with the following:

MIL-C-2184F

<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

TABLE II. Test methods

<u>Characteristics</u>	<u>Requirement paragraph</u>	<u>Test method</u>
Yarn-singles:		
Warp	3.2.2	Visual <u>1/</u>
Filling	3.2.2	Visual <u>1/</u>
Colorfastness to:		
Light	3.3.3	5660
Perspiration	3.3.3	5680
Crocking	3.3.3	5651
Laundering	3.3.3	5614 <u>2/</u>
Weave	3.4	Visual <u>1/</u>
Yarns per inch:		
Warp	3.4	5050
Filling	3.4	5050
Weight	3.4	5041
Breaking strength:		
Warp	3.4	5100
Filling	3.4	5100
Shrinkage in relaxation:		
Warp	3.5.1	5558 <u>3/</u>
Filling	3.5.1	5558 <u>3/</u>
Shrinkage in felting:		
Warp	3.5.1	5554 <u>3/</u>
Filling	3.5.1	5554 <u>3/</u>
Stiffness	3.5.1.1	5202 <u>4/</u>
Alkali solubility	3.5.1.2	2800 <u>5/</u>
pH	3.5.2	2811
Wool content (finished cloth)	3.7	2101

1/ One determination per sample unit and the result reported as "pass" or "fail".

MIL-C-2184F

- 2/ Only the stain on the wool fiber of the color transfer cloth shall be evaluated.
- 3/ The felting shrinkage (Method 5554) shall be determined on the sample specimens used for relaxation shrinkage (Method 5558) and determined by the following formula:

$$\text{Felting shrinkage percent} = \frac{B-F}{B} \times 100$$

Where: B = Average measurements after relaxation
F = Average measurements after felting

- 4/ Five specimens only in the warp direction shall be tested.
- 5/ Two treated and two untreated specimens shall be tested per sample unit.

5. PREPARATION FOR DELIVERY

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

5.1.1 Levels A and C. The cloth shall be put-up and packaged in accordance with the applicable requirements of PPP-P-1132.

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-1132.

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-1132.

6. NOTES

6.1 Intended use. The wool flannel cloth is intended for use as shirting material for wear by male and female personnel of the Department of Defense.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Color of cloth required (see 3.3).
- (c) Minimum length if other than specified (see 3.6).
- (d) Selection of applicable levels of put-up, packaging and packing (see 5.1 and 5.2).

MIL-C-2184F

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

6.4 Suggested but not mandatory dyestuff formulations for Olive Green 108 and Air Force Blue 1084 are as follows. The standard shade samples have been dyed with these formulations:

Olive Green 108

Acid Green 58
 Acid Green 70
 (1 to 1 ratio)
 Acid Blue 171
 Acid Yellow 127
 Acid Orange 86 or Acid Orange 80

Air Force Blue 1084

Primary No. 1:
 Mordant Blue 9, CI 14855
 Primary No. 2:
 Sol. Vat Blue 1, CI 73002
 Primary No. 3:
 Acid Black 48, CI 65005
 Acid Violet 34, CI 61710/800

6.5 Only those shrink-resistant chemical 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 (see 3.5.1).

* 6.6 Sears Fabric Defect Scales are available from Sears Roebuck and Company, Department 769, "Fabric Defect Replica Kit", 925 South Homan Avenue, Chicago, Illinois 60607.

6.7 Marginal notations. The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections) 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 suppliers 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.

Custodians:

Army - GL
 Air Force - 11

Preparing activity:

Army - GL
 Project No. 8305-0132

Review activities:

Army - MD
 Air Force - 82