

MIL-C-2049E

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SUPERSEDING

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3 July 1968

MILITARY SPECIFICATION

CLOTH, FLEECE, WOOL, 21.5 OUNCE

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 a 21.5 ounce woolen cloth.

2. APPLICABLE DOCUMENTS

- * 2.1 Issues of documents. 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

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MIL-C-43665 - Cloth, Wool: Mothproofing Treatment of

STANDARDS

FEDERAL

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

FSC 8305

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MIL-STD-105 - Sampling Procedures and Tables for Inspection
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.)

LAWS AND REGULATIONS

U.S. Department of Agriculture

Methods of Test for Grade of Wool

(Application for copies should be addressed to the U.S. Department of Agriculture, Agricultural Marketing Service, Washington, DC 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, DC 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 Materials.

3.2.1 Wool. The wool shall be fleece or pulled wool, or any combination thereof, not lower in grade than 50's U.S. Standard. The use of reprocessed wools, reused wools, or any wool waste, or wool manufacturing by-products other than those resulting from the contractor's own current production of this cloth are prohibited. Garnetts of any kind are prohibited.

3.2.2 Yarn. The wool shall be carded, and spun on the woolen system into single yarns for both warp and filling (see 4.4).

3.3 Color. The color shall be Olive Green 118 produced by blending stock dyed wools of olive green with white wool and shall match the standard sample (see 6.3 and 6.5).

* 3.3.1 Mothproofing. In the dyeing operation the stock 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 artificial daylight having a color temperature of 7500° Kelvin and shall be a good approximation to the standard sample under incandescent lamplight of 2800° Kelvin.

3.3.3 Colorfastness. The finished cloth shall show fastness to wet drycleaning and perspiration, 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 wet drycleaning and perspiration. Tests 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), inches (minimum)	Weight (based on linear yd. of 56 in. width) ounces (minimum)	Yarns per in (minimum)		Breaking strength pounds (minimum)	
		Warp	Filling	Warp	Filling
60	21.5	28	30	50	50

3.4.1 Weave. The weave shall be 2/2 broken twill, 2 ends to the right and 2 ends to the left (see 4.4).

3.5 Finish. The cloth shall be scoured, fulled, and both sides napped (see 4.4) so as to produce a degree of finish equal to that of the standard sample. The character of nap shall be such as will cause the napped fibers to offer resistance to lifting with a needle equal to or better than the standard sample (see 6.4).

3.5.1 pH. The pH value of the water extract of the finished cloth shall be not lower than 4.0 or higher 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 40 yards. Each length shall be put up in a full width roll 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).

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- * 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 4.2.3.3). The marking shall be clearly legible in any indelible marking medium used commercially and shall not bleed through to the face of the cloth.

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 4.2.3.1.1 and 4.2.3.5).

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 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. 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 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.

4.2.1.1 Wool. The wool shall be visually examined for grade (see 3.2.1.) in the scoured form (prior to picking, carding or dyeing) by comparison with the applicable U.S. Standard. In the event of dispute, resulting from this comparison, the wool grade shall be determined by a width method (wedge). The examination for grade shall be performed on a composite sample of one pound of scoured wool for each 10,000 pounds or fraction thereof of the lot. The composite sample shall be selected from not less than 10 percent of the bales or bags in the lot. The lot shall be unacceptable if the sample does not conform to the requirements of 3.2.1.

4.2.2 Inprocess inspection. Inspection shall be made at any point during any phase of the manufacturing process to assure that only approved wools 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 inprocess inspection has indicated nonconformance.

4.2.3 Examination of the end item. Examination of the end item shall be in accordance with 4.2.3.1 through 4.2.3.5.

- * 4.2.3.1 Yard-by-yard examination. Each roll in the sample shall be examined on the face side (however the side shall be alternated on every other roll). 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 4.2.3.1.1. 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 no individual roll exceeds 15.0 points per 100 square yards, the lot shall be acceptable with respect to this characteristic. 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:

<u>Total points scored in sample x 3600</u>	=	Points per 100 square yards
<u>Contracted width of cloth (inches) x Total yards inspected</u>		

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4.2.3.1.1 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:

Degree and character of finish on face and back not equal to standard sample.
 Mottled, cloudy, or streaky.
 Width less than specified.
 Baggy, ridgy, or wavy cloth.
 Shade defects - off shade, shaded side to side, side to center or end to end.

4.2.3.2 Examination for length.

4.2.3.2.1 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.

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

* 4.2.3.3 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, incorrect or illegible from either or both ends, or bleed through occurring.
 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.

- * 4.2.3.4 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 or 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.
- * 4.2.3.5 Examination for defect marking (stringing of defects). 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 five fabric defects (red or white strings) not strung shall be classified as a defective roll in regard to the defect marking requirement. 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), or more than 30 fabric defects (red or white strings) not strung in the sample.
- * 4.3 Packaging inspection. Examination shall be made in accordance with the provisions of PPP-P-1132 to determine whether packaging, packing and marking comply with the section five 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 methods. The sample unit shall be 1 yard full width of the finished cloth. The lot shall be unacceptable if one or more sample units fail to meet any requirement specified. The lot size shall be expressed in units of 1 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:

<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

<u>Characteristic</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>
Mothproofing content	3.3.1	<u>2/</u>
Colorfastness to:		
Perspiration	3.3.3	5680
Wet drycleaning	3.3.3	5622
Weight	3.4	5041
Yarns per inch:		
Warp	3.4	5050
Filling	3.4	5050
Breaking strength:		
Warp	3.4	5100
Filling	3.4	5100
Weave	3.4.1	Visual <u>1/</u>
Finish:		
Scoured	3.5	<u>3/</u>
Fulled	3.5	<u>3/</u>
Napped	3.5	<u>3/</u>
pH	3.5.1	2811
Wool content (finished cloth)	3.7	2101

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

2/ As specified in MIL-C-43655.

3/ A certification of compliance shall be submitted and will be acceptable for the stated requirement.

5. PACKAGING

* 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, 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 packing. 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 in the contract or order, shipments shall be marked in accordance with the requirements of PPP-P-1132.

6. NOTES

6.1 Intended use. The cloth is intended for use in a removable liner for firemen's Olive Green 107 coat used by the Department of Defense.

6.2 Ordering data. Procurement documents should specify the following:

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

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

6.4 Finish. The napping process may be started either wet or dry. The use of a single acting napper should be limited to the breaker operations.

6.5 Olive Green 118 dye formula. A suggested but not mandatory formula for shade Olive Green 118 dyed wools (see 3.3) used for blending with white wool is as follows:

Acid Green 25, CI 61570
Mordant Orange 6, CI 26520
Mordant Brown 40, CI 17590
Mordant Red 9, CI 16105
Mordant Yellow 16, CI 15100

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

Custodians:

Army - GL
Navy - SA
Air Force - 11

Preparing activity:

Army - GL
Project No. 8305-0036

Review activities:

Army - MD
Air Force - 82
DSA - CT

User activity:

Navy - MC