

MIL-C-43204C(GL)
31 December 1985
SUPERSEDING
MIL-C-43204B(GL)
23 March 1977

MILITARY SPECIFICATION

CLOTH, SPACER (OLEFIN)

This specification is approved for use by Natick Research and Development Center, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This document covers the requirements for spacer cloth.

1.2 Classification. The spacer cloth shall be of the following types as specified (see 6.2).

Type I - 9.5 oz per sq yd (min)
Type II - 15.0 oz per sq yd (min)
Type III - 8.25 oz per sq yd (min)

2. APPLICABLE DOCUMENTS

2.1 Government documents. Unless otherwise specified, the following documents of the issue in effect on date of invitation for bids or request for proposal form a part of this document to the extent specified herein.

SPECIFICATIONS

FEDERAL

PPP-P-1133 - Packaging of Synthetic Fiber Fabrics

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to U.S. Army Natick Research and Development Center, Natick, MA 01760-5014, 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

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STANDARDS

FEDERAL

FED-STD-191 - Textile Test Methods

MILITARY

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

(Copies of documents required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

OTHER GOVERNMENT DOCUMENTS

Laws and Regulations

Rules and Regulations Under the Textile Fiber Products Identification Act

(Application for copies should be addressed to the Federal Trade Commission, Washington, D.C. 20580.)

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

3. REQUIREMENTS

3.1 First article. When specified, a sample shall be subjected to first article inspection (see 4.3, 6.2, and 6.3).

3.2 Materials.

3.2.1 Polyethylene yarn (type I and type III). The polyethylene yarn for warp No. 1 and No. 2 shall be shrinkable branch type polyethylene. The yarn diameter shall be 0.010 inch plus or minus 0.001 inch initially, prior to fabrication of the finished cloth.

3.2.2 Polypropylene yarn (type I and type III). The polypropylene yarn for warp No. 3 and the filling shall have a diameter of 0.010 inch plus or minus 0.001 inch initially, prior to fabrication of the finished cloth.

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3.2.3 Polyethylene yarn (type II). The polyethylene yarn for the warp and filling shall be medium density polyethylene type. Yarn size for the warp and filling shall be 960 denier prior to finishing of the woven cloth.

3.3 Color. The color of the cloth shall be that resulting from the color of the yarns available at the time of acquisition.

* 3.4 Physical requirements. The finished cloth shall conform to the requirements specified in table I when tested as specified in 4.5.

TABLE I. Physical requirements

Characteristics	Requirements		
	<u>Type I</u>	<u>Type II</u>	<u>Type III</u>
Weight oz/sq yd	9.5 min, 11.5 max	15.0 min, 19.5 max	8.25 min, 10.25 max
Thickness, min (inches)			
Initial	0.170	0.120	0.170
Compressed	0.075	0.070	0.045
After compression	0.150	0.100	0.150
Texture, min			
Warp No. 1			
Polyethylene	20 ends/inch	58 ends/inch	19 ends/inch
Warp No. 2			
Polyethylene	19 ends/inch	-	19 ends/inch
Warp No. 3			
Polypropylene	27 ends/inch	-	25 ends/inch
Filling			
Polypropylene	70 picks/inches	-	64 picks/inch
Polyethylene	-	35 picks/inch	-

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TABLE I. Physical requirements - Continued

Characteristics	Requirements		
Breaking strength, min (pounds)			
Warp	110	175	110
Filling	200	100	180

3.4.1 Width. Unless otherwise specified (see 6.2), the width shall be a minimum of 58 inches, inclusive of selvage.

3.4.2 Weave.

3.4.2.1 Type I and type III. The cloth shall have a weave that is formed by the weaving of three warps. The yarn for warp No. 1 and No. 2 shall conform to 3.2.1, and the yarn for warp No. 3 and the filling shall conform to 3.2.2. The weave pattern shall be as shown in figure 1.

3.4.2.2 Type II. The cloth shall have a honeycomb weave pattern as shown in figure 2.

3.5 Finishing. The cloth shall be so processed as to meet the physical requirements in 3.4 and the dimensional stability requirement in 3.5.1.

3.5.1 Dimensional stability.

3.5.1.1 Type I. The finished type I cloth shall show a dimensional change of not more than 4.0 percent in the warp direction and not more than 2.0 percent in the filling direction when tested as specified in 4.5.

3.5.1.2 Type II. The finished type II cloth shall show a dimensional change of not more than 8.5 percent in the warp direction and not more than 6.2 percent in the filling direction when tested as specified in 4.5.

3.5.1.3 Type III. The finished type III cloth shall show a dimensional change of not more than 8.5 percent in the warp direction and not more than 2.0 percent in the filling direction when tested as specified in 4.5.

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3.6 Length and put-up. Unless otherwise specified, the finished cloth shall be furnished in continuous lengths, each not less than 35 yards. The cloth shall be put up in a full width roll as specified in 5.1.

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

3.8 Workmanship. The finished cloth shall conform to the quality and grade of product established by this document. 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 purchase 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 document 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 Classification of inspection. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).

4.3 First article inspection. When a first article is required (see 6.2), it shall be visually inspected for appearance.

4.4 Quality conformance inspection. Unless otherwise specified, sampling for inspection shall be performed in accordance with MIL-STD-105.

4.4.1 Component and material inspection. In accordance with 4.1, components and materials shall be inspected in accordance with all the requirements of referenced documents unless otherwise excluded, amended, modified, or qualified in this document or applicable purchase document.

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4.4.2 Examination of the end item. Examination of the end item shall be in accordance with 4.4.2.1 through 4.4.2.3.

4.4.2.1 Yard-by-yard examination. The defects listed below shall be counted regardless of their proximity to each other, except where two or more defects represent a single local condition of the cloth, in which case only one defect shall be counted. A continuous defect shall be counted as one defect for each warpwise yard or fraction thereof in which it occurs. The sample unit shall be 1 linear yard. The inspection level shall be I, and the acceptable quality level (AQL) shall be 6.5 defects per hundred yards. An approximately equal number of yards shall be examined from each roll selected. (The number of rolls from which the sample is to be selected shall be in accordance with table II.)

Defects

Broken pick over one quarter the width of the cloth
Width less than specified
Harness skip
End out over three inches
Open or thin place
Wrong draw
Spots and stains
Any cut, hole, or tear
Mispick
Misweave

4.4.2.2 Overall examination. Each defect listed below shall be counted not more than once in each roll examined. The sample unit shall be one roll. The sample size (number of rolls selected as sample) and the number of defects acceptable shall be shown in table II.

Defects

Overall uncleanness or soiled
Buckled, ridgy, wavy, or distorted

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TABLE II. Sample size

Lot size in yards	Sample size in rolls	Acceptable number of defects
Up to 1200 $\frac{1}{2}$	3	0
1201 up to and including 3200	5	0
3201 up to and including 10,000	8	0
10,001 up to and including 35,000	13	0
35,001 and over	20	1

$\frac{1}{2}$ If lot contains fewer than 3 rolls, each roll in the lot shall be examined.

4.4.2.3 Length examination.

4.4.2.3.1 Examination for length of individual rolls. The rolls shall be examined for gross length. Any gross length found to be less than the specified minimum length or any gross length found to be more than 1 yard below the gross length marked on the roll ticket shall be considered as a defect with respect to length. The sample unit for this examination shall be one roll. The number of rolls selected as a sample (sample size) for this examination and the acceptance number shall be in accordance with table II.

4.4.2.3.2 Examination for total yardage in sample. The lot shall be unacceptable if the total of the actual gross length of rolls in the sample is less than the total of the gross lengths marked on roll tickets.

4.4.3 Packaging inspection. The inspection shall be in accordance with the quality assurance provisions of PPP-P-1133.

4.5 Tests. The methods of testing specified in FED-STD-191, wherever applicable and as specified in table III, shall be followed. The sample unit shall be 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 1 yard. The sample size (number of sample units) shall be in accordance with the following:

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

TABLE III. Test methods

<u>Characteristic</u>	<u>Requirement reference</u>	<u>Test method</u>
Yarn identification	3.2.1, 3.2.2, and 3.2.3	<u>1/</u>
Yarn diameter, denier	3.2.1, 3.2.2, and 3.2.3	<u>1/</u>
Weight	3.4	5041
Thickness		
Initial	3.4	4.5.1
Compressed	3.4	4.5.1.3.1
After compression	3.4	4.5.1.3.2
Texture		
Warp No. 1 - Polyethylene	3.4	5050
Warp No. 2 - Polyethylene	3.4	5050
Warp No. 3 - Polypropylene	3.4	5050
Filling - Polypropylene	3.4	5050
Filling - Polyethylene	3.4	5050

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TABLE III. Test methods - Continued

Characteristic	Requirement reference	Test method
Breaking strength		
Warp	3.4	5104
Filling	3.4	5104
Weave	3.4.2	Visual <u>1/</u>
Dimensional stability	3.5.1	4.5.2

1/ Unless otherwise specified, a certificate of compliance shall be submitted and will be acceptable for the stated requirement.

4.5.1 Determination of thickness values.

4.5.1.1 Preparation of specimen. Five specimens shall be cut from different parts of a full width sample and shall measure not less than 6 inches by 6 inches.

4.5.1.2 Apparatus. The test apparatus shall be a compressometer with a round pressure foot of 20 square inches area with a bearing surface capable of measuring 0.01 pound per square inch to 10.0 pounds per square inch without moving the specimen from under the pressure foot once the test is started. The pressure plate shall travel 0.2 inch per minute.

4.5.1.3 Procedure. Balance the compressometer. After balancing, place a test specimen under the pressure foot area and set the machine for 0.10 pound per square inch thickness. Lower the pressure foot and record the thickness reading under 0.10 pound per square inch as "Initial Thickness of Specimen". Immediately after determining the initial thickness, lower the pressure foot until the pressure on the specimen has reached 10.0 pounds per square inch. Maintain the 10.0 pounds per square inch pressure on the specimen for one minute. At the end of the 1-minute period, record the thickness of the specimen as the "Compressed Thickness". Remove the pressure immediately and completely. After removal of the pressure, allow the specimen to relax for five minutes. Repeat the procedure of compression and relaxation five times

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on the same specimen. After the fifth load of 10 pounds has been removed and the specimen again relaxed without load for five minutes, measure the specimen at 0.10 pounds per square inch and read the thickness reading as the "Thickness of the Specimen after Compression".

4.5.1.4 Report. The initial thickness, compressed thickness, and thickness after compression shall be determined on five specimens, and the individual characteristic results averaged and reported to the nearest 0.001 inch.

4.5.2 Dimensional stability.

4.5.2.1 Test specimen. The specimen shall be a square of cloth 24 by 24 inches cut from different areas of the material and marked off in 18-inch lengths in the warp and filling direction. No specimen shall contain the same filling yarns.

4.5.2.2 Apparatus. Hot air oven capable of maintaining a temperature of $200^{\circ} \pm 5^{\circ}\text{F}$.

4.5.2.3 Procedure. Place the specimen in the hot air oven for 30 minutes at a temperature of $200^{\circ} \pm 5^{\circ}\text{F}$. Remove the specimen and allow it to cool before determining the dimensional changes of the cloth. Unless otherwise specified, three specimens shall be tested from each sample unit. The percent change of the sample unit shall be the average of the three specimens tested and shall be reported separately for the warp and filling to the nearest 0.1 percent. When a test result registers elongation (gain) rather than a shrinkage, each elongation result shall be prefixed with a minus sign and both the minus sign and the value enclosed in parentheses.

* 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 Levels A and Commercial. The cloth shall be put-up and preserved in accordance with the applicable requirements of PPP-P-1133.

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 PPP-P-1133.

5.3 Marking. In addition to any special marking required by the contract or purchase order, shipments shall be marked in accordance with the applicable requirements of PPP-P-1133.

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6. NOTES

6.1 Intended use. This cloth is intended to be used as a spacer fabric in equipage items.

6.2 Ordering data. Acquisition documents should specify the following:

- a. Title, number, and date of this document.
- b. Type required (see 1.2).
- c. When a first article is required (see 3.1, 4.3, and 6.3).
- d. Width of cloth required if other than specified (see 3.4.1).
- e. Length and put-up required if other than specified (see 3.6).
- f. Selection of applicable levels of put-up, preservation, and packing (see 5.1 and 5.2).

* 6.3 First article. When a first article is required, it shall be inspected and approved under the appropriate provisions of FAR 52.209. The first article should be a preproduction sample. The first article should consist of 2 yards. The contracting officer should include specific instructions in all acquisition instruments regarding arrangements for examinations, test, and approval of the first article.

6.4 Shrinkage. The polypropylene is considered as being a nonshrinkable portion of the fabric, but basically polypropylene yarn will have up to 5 percent residual shrinkage.

6.5 Changes from previous issue. The margins of this document 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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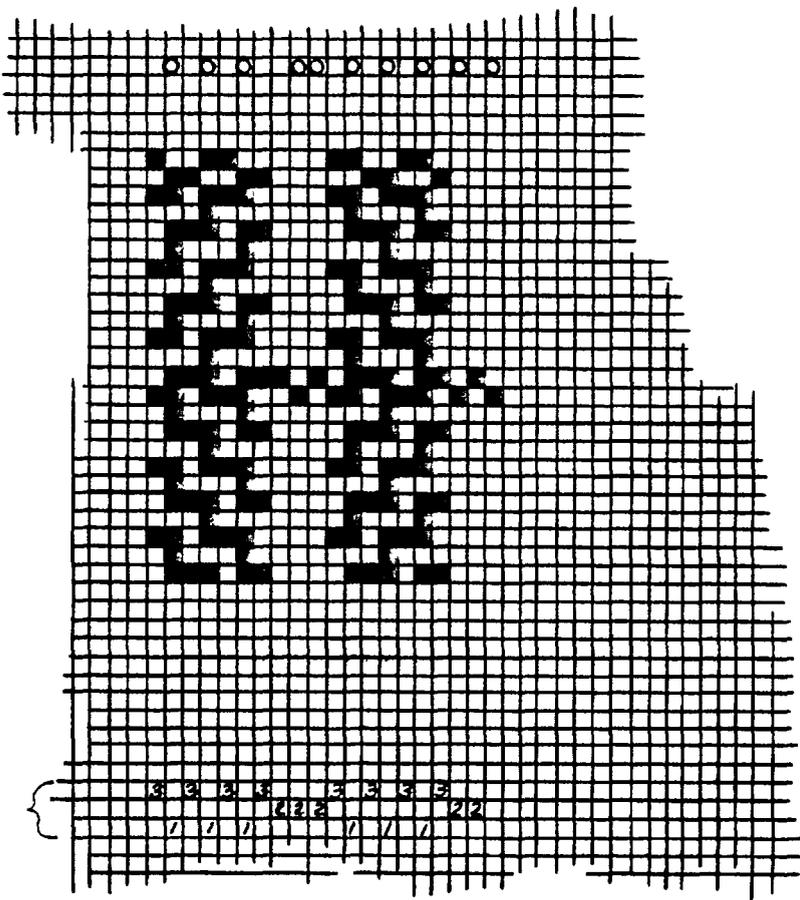
Review activities:

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TYPE I AND TYPE III

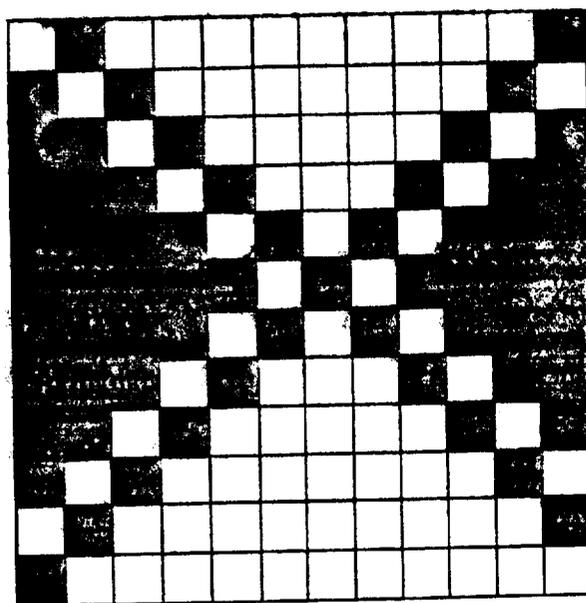


(SHRINKABLE WARP YARNS SHOWN BY CIRCLES)

Figure 1. Warp Arrangement

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TYPE II



12 PICKS

12 ENDS

Figure 2. Weave Diagram

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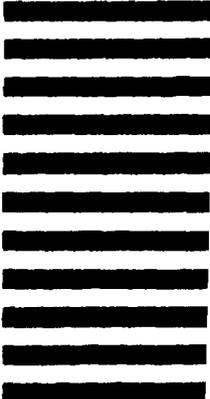
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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER MIL-C-43204C(GL)		2. DOCUMENT TITLE Cloth, Spacer (Olefin)	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one)	
b. ADDRESS (Street, City, State, ZIP Code)		<input type="checkbox"/> VENDOR	
		<input type="checkbox"/> USER	
5. PROBLEM AREAS		<input type="checkbox"/> MANUFACTURER	
		<input type="checkbox"/> OTHER (Specify) _____	
		a. Paragraph Number and Wording	
b. Recommended Wording			
c. Reason/Rationale for Recommendation.			
6. REMARKS			
7a. NAME OF SUBMITTER (Last, First, MI) - Optional		b. WORK TELEPHONE NUMBER (Include Area Code) - Optional	
c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional		8. DATE OF SUBMISSION (YYMMDD)	