

MIL-C-44017 (GL)
20 December 1979
SUPERSEDING
(See 6.6)

MILITARY SPECIFICATION

CLOTH, SPACER, POLYETHYLENE AND NYLON

This specification is approved for use by US Army Natick Research and Development Command, 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 specification covers one type of spacer cloth used in the explosive ordnance disposal uniform.

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:

SPECIFICATION

FEDERAL

PPP-P-1133 - Packaging and Packing of Synthetic Fiber Fabrics

STANDARDS

FEDERAL

FED-STD-191 - Textile Test Methods

MILITARY

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

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: US Army Natick Research and Development Command, Natick, MA 01760 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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(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.)

LAW 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.)

3. REQUIREMENTS

3.1 Standard sample. The dyed and finish cloth shall be equal to the standard sample with respect to all characteristics for which the standard sample is referenced (see 6.3).

3.2 First article. When specified (see 6.2) the contractor shall furnish a sample for first article inspection and approval (see 4.3 and 6.5).

3.3 Materials.

3.3.1 Polyethylene yarn. The polyethylene yarn for warp no. 1 and for filling no. 1 shall be shrinkable branch type polyethylene. The yarn diameter shall be 0.010 inch (0.25 mm) plus or minus 0.001 inch (0.025 mm) initially, prior to fabrication of the finished cloth.

3.3.2 Nylon yarn. The nylon yarn for the warp no. 2 and for filling no. 2 shall be monofilament nylon. The yarn diameter of the warp shall be 0.009 inch (0.23 mm) plus or minus 0.001 inch (0.025 mm) and the yarn diameter of the filling shall be 0.006 inch (0.15 mm) plus or minus 0.001 inch (0.025 mm) initially, prior to fabrication of the finished cloth.

3.4 Color. The color shall be the commercial shade available.

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

TABLE I. Physical requirements

Weight		Yarns per inch		Breaking strength		Thickness
ounce per		(cm)		lbs. (N)		inch (mm)
sq. yd. (gm ²)		(min)		(min)		(min)
(min)	(max)	Warp	Filling	Warp	Filling	
5.5	8.5	(Polyethy-	(Polyethy-	120	30	0.260 Initial
(186)	(288)	lene)	lene)	(534)	(133)	(7)
		3 No. 1	12 No. 1			
		(3)	(5)			
		(Nylon)	(Nylon)			0.040 Compressed
		29 No. 2	28 No. 2			(1)
		(11)	(11)			
		37 Total	40 Total			0.240 After com-
		(15)	(16)			(6) pression

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3.5.1 Width. Unless otherwise specified (see 6.2), the width shall be a minimum of 45 inches (114 cm), inclusive of selvages.

3.5.2 Weave. The cloth shall have a weave which is formed by the weaving of two warps and two fillings. After finishing, the fabric shall have a waffle effect produced by a series of broken ridges and depressions in both the warp and filling dimensions. The weave pattern shall be as shown in figure 1.

3.6 Finishing. The cloth shall be so processed as to meet the physical requirements in 3.5 and the dimensional stability requirements specified in 3.6.1.

3.6.1 Dimensional stability. The finished cloth shall show no dimensional change greater than 4.0 percent in the warp and not more than 2.0 percent in the filling direction when tested as specified in 4.5.

3.7 Length and put-up. Unless otherwise specified (see 6.2) the finished cloth shall be furnished in continuous lengths, each not less than 35 yards (32 m). Each length shall be put-up in a full width roll as specified in PPP-P-1133.

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

3.9 Workmanship. The finished cloth shall conform to the quality and grade 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, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, 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 Classification of inspection. The inspection requirements specified herein are classified as follows:

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

4.3 First article inspection. The first article submitted in accordance with 3.2 shall be visually inspected for appearance and finish. The sample shall be tested for physical properties in accordance with the 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 hereinafter.

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 purchase documents.

4.4.2 Examination of the end item. The cloth shall be examined in accordance with 4.4.2.1, 4.4.2.2, and 4.4.2.3.

4.4.2.1 Yard-by-yard examination. The required yardage shall be examined on one side. 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 one linear yard. The inspection level shall be level II of MIL-STD-105, and the acceptable quality level shall be 6.5 defects per one hundred units (yards). The lot size shall be expressed in units of one yard. 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 one quarter or more of the width of the cloth
 Width less than specified
 Harness skips, repeating over one quarter or more of the width of the cloth,
 and multiple floats
 End out over more than three inches
 Open or thin place
 Wrong draw, causing yarn to be woven out of sequence
 Spot or stain
 Any cut, hole or tear
 Misspick
 Missweave

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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

Shape of cloth not equal to standard
Overall uncleanness or soiled
Objectionable odor

TABLE II. Sample size

Lot size in yards	Sample size in rolls	Acceptance number
Up to 1300 ^{1/}	3	0
1301 up to and including 3200	5	0
3201 up to and including 8000	7	0
8001 up to and including 22,000	10	0
22,001 up to and including 110,000	15	1
110,001 and over	25	1

^{1/} If lot contains fewer than 3 rolls, each roll in the lot shall be examined.

4.4.2.3 Examination for length.

4.4.2.3.1 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 specified minimum length or any gross length found to be more than 1 yard less than 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 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 length marked on the tickets.

4.4.2.4 Examination for compliance with Textile Fiber Products Identification Act. During the yard-by-yard examination, each roll in the sample shall be examined for conformance to the Textile Fiber Products Identification Act. Each roll not labeled in accordance with this act shall be a defect. The lot shall be unacceptable if two or more of these defects occur.

4.4.3 Examination of preparation for delivery requirements. Examination shall be made in accordance with the provisions of PPP-P-1133 to determine that packaging, packing and marking comply with section 5 requirements.

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4.5 Testing of the end item. The methods of testing specified in FED-STD-191 wherever applicable, and as listed in table III 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 2 continuous yards, full width, of the finished cloth. All test reports shall contain the individual values utilized in expressing the final result. The lot size shall be expressed in units of 1 yard. The lot shall be unacceptable if one or more units fail to meet any requirement specified. 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

TABLE III. Test methods

<u>Characteristic</u>	<u>Requirement paragraph</u>	<u>Test method</u>
Yarn identification		
Polyethylene (Warp No. 1) (Filling No. 1)	3.3.1	<u>1/</u>
Nylon (Warp No. 2) (Filling No. 2)	3.3.2	1530 <u>1/</u>
Yarn diameter		
Polyethylene	3.3.1	<u>1/</u>
Nylon	3.3.2	<u>1/</u>
Yarns per inch		
Warp 1 - Polyethylene	3.5	5050
Warp 2 - Nylon	3.5	5050
Filling 1 - Polyethylene	3.5	5050
Filling 2 - Nylon	3.5	5050
Weight	3.5	5041
Thickness		
Initial	3.5	4.5.1.3
Compressed	3.5	4.5.1.3.1
After compression	3.5	4.5.1.3.2

TABLE III. Test methods (cont'd)

Characteristic	Requirement paragraph	Test method
Breaking strength	3.5	5104
Weave	3.5.2	Visual <u>2/</u>
Dimensional stability	3.6.1	4.5.2

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

2/ One determination shall be made from each sample unit and the results reported as "pass" or "fail".

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 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 pounds per square inch to 10.0 pounds per square inch without moving the specimen from under the pressure foot once the test is started.

4.5.1.3 Procedure. The compressometer shall be balanced. After balancing, a test specimen shall be placed under the pressure foot and the machine set for 0.10 pounds per square inch pressure. The pressure foot is then lowered and the thickness reading under 0.10 pounds per square inch recorded as "Initial Thickness of Specimen".

4.5.1.3.1 Immediately after determining the initial thickness, the pressure foot shall be lowered until the pressure on the specimen has reached 10.0 pounds per square inch. The 10.0 pounds per square inch pressure shall be maintained on the specimen for one minute. At the end of the one minute period the thickness of the specimen shall be recorded as the "Compressed Thickness".

4.5.1.3.2 The pressure shall be immediately and completely removed. After removal of the pressure, the specimen is allowed to relax for five minutes. The procedure of compression and relaxation shall be repeated five times on the same specimen. After the fifth load of 10 pounds has been removed and the specimen again relaxed without load for five minutes, the specimen is then measured at 10.0 pounds per square inch and the thickness reading recorded as the "thickness of the Specimen after Compression".

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4.5.1.3.3 Report. The initial thickness, compressed thickness and thickness after compression shall be determined on five specimens, and the individual characteristic results average 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 allowed to rest for at least 12 hours in standard conditions as defined in FED-STD-191, and marked off in 18-inch lengths in the warp and filling direction, and no specimen shall contain the same filling yarns.

4.5.2.2 Apparatus

4.5.2.2.1 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 $200^{\circ} \pm 5^{\circ}\text{F}$. The specimen is then removed and allowed to cool for a minimum of 12 hours in standard conditions as defined in FED-STD-191 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 3 specimens tested and shall be reported to the nearest 0.1 percent.

4.5.2.3.1 When a test result registers elongation (gain) rather than shrinkage each elongation result shall be prefixed with a minus sign and both the minus sign and the value inclosed in parentheses.

5. PREPARATION FOR DELIVERY

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

5.1.1 Level A and C. The cloth, put-up on rolls, shall be packaged in accordance with the applicable requirements of PPP-P-1133.

5.2 Packing. Packing shall be level A 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-1133.

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

6. NOTES

6.1 Intended use. This cloth is intended for use as a spacer layer for the explosive ordnance disposal uniform. This spacer layer will provide an opening in order to facilitate the flow of air throughout the uniform.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number and date of this specification.
- (b) First article (see 3.2.4.2 and 6.5).
- (c) Width of cloth required if other than specified (see 3.5.1).
- (d) Length of roll required if other than specified (see 3.7).
- (e) Selection of applicable levels of packaging and packing (see 5.1 and 5.2).

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

6.4 Uniroyal Inc. Style 6028 spacer fabric has been found to be satisfactory in meeting the requirements of this specification.

6.5 First article. When a first article is required, it shall be inspected and approved under the appropriate provisions of ASPR 7-104.55. The first article should be a preproduction sample consisting of 2 yards of the finished cloth. The contracting officer should include specific instructions in all procurement instruments regarding arrangements for inspection and approval of the first article.

6.6 Supersession data. This specification includes the requirements of Limited Production Purchase Description, LP/P. DES 27-73 - Cloth, Spacer, Polyethylene and Nylon, dated 30 October 1973.

6.7 Metric equivalents. Metric equivalents, indicated in parentheses throughout this document, are based on practices, conversion factors, and symbols specified in ASTM E 380 Standard for Metric Practice, and are for information only. In each instance, the value stated in US customary units shall be controlling.

Custodian:

Army - GL

Preparing activity:

Army - GL

Review activities:

Army - MD

DLA - CT

Project No. 8305-A717

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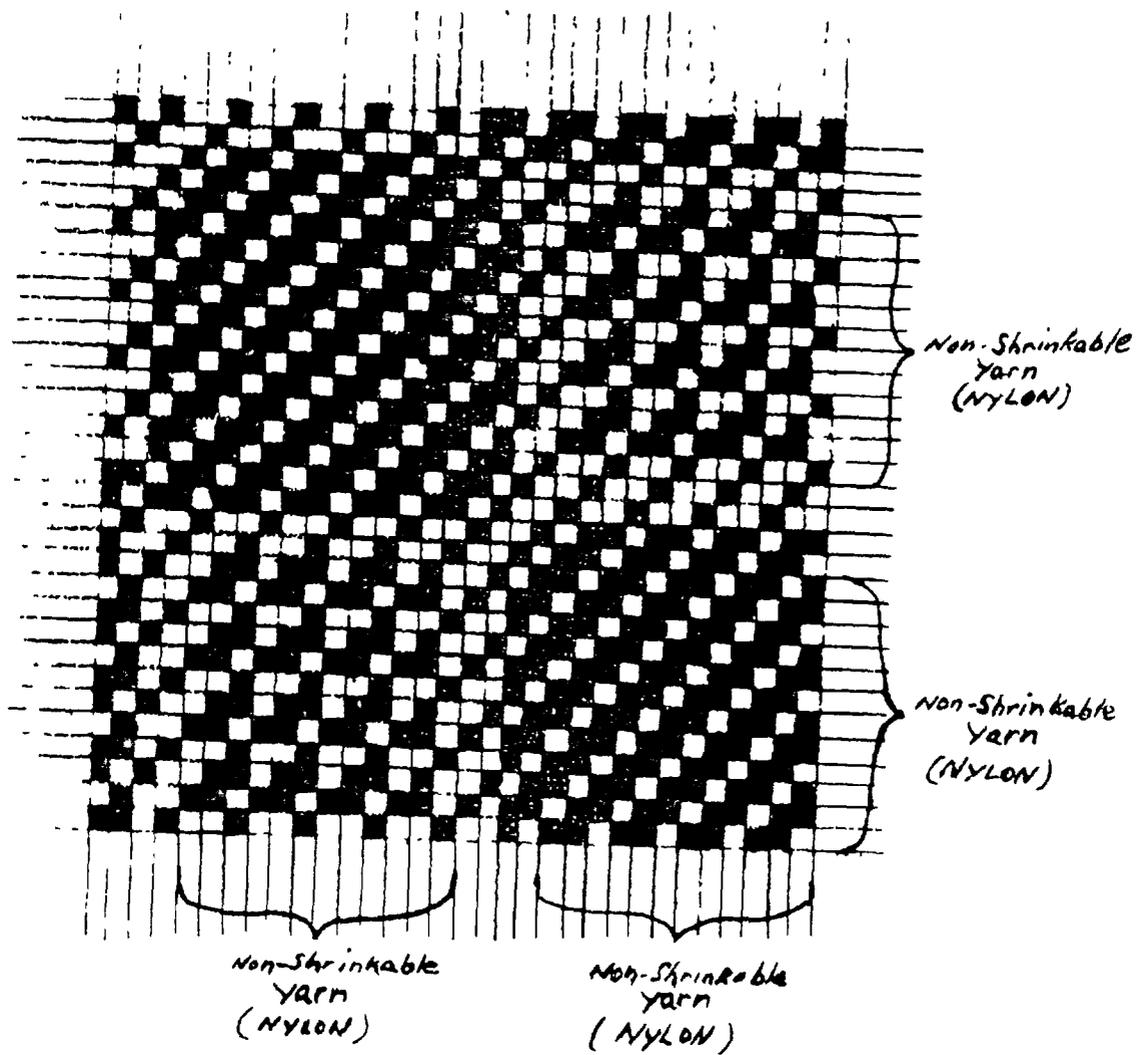


FIGURE 1

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