INCH-POUND

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SUPERSEDING
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MILITARY SPECIFICATION

BATTING, SYNTHETIC FIBERS, QUILTED, ARAMID

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

1. SCOPE

1.1 Scope. This Specification covers the requirements for a 7.0 oz/sq yard (237.3 g/m^2) quilted aramid batting.

2. APPLICABLE DOCUMENTS

2.1 Government documents

2.1.1 Specifications, standards, and handbooks. The following Specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Defense Personnel Support Center, Clothing and Textiles Directorate, Attn: DPSC-FSSD, 2800 South 20th Street, Philadelphia, PA 19101-8419, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 8320

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

SPECIFICATIONS

FEDERAL

V-T-295	- Thread, Nylon
PPP-P-1133	- Packaging and Packing of Synthetic Fiber Fabrics

MILITARY

MIL-C-43774	- Cloth, Plain or Pajama Check Weave Aramid

STANDARDS

FEDERAL

FED-STD-191	- Textile Test Methods
FED-STD-751	- Stitches, Seams, and Stitchings

MILITARY

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.)

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this Specification to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the Solicitation.

* 2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS

ASTM-D 3776 Mass Per Unit Area (Weight) of Woven Fabric

(Applications for copies should be addressed to American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

Rules and Regulations Under the Textile Fiber Products Identification Act.

(Copies may be obtained without charge from the Federal Trade Commission, Washington, DC 20580.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS

STM-D-3776 Mass Per Unit Area (Weight) of Woven Fabric

(Applications for copies should be addressed to American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

2.3 Order of precedence. In the event of a conflict between the text of this Specification and the references cited herein, the text of this document shall take precedence. Nothing in this Specification; however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 The requirements specified in 3.5.1, 3.5.2.2, 3.8, and related paragraphs in Section 4 apply only to batting purchased directly by the Government. All other requirements apply to batting purchased as a component of an end item by a contractor, as well as batting purchased directly by the Government.

* 3.2 First article. When specified, the contractor shall furnish sample unit(s) for first article inspection and approval (see 4.3 and 6.2).

* 3.3 Material

* 3.3.1 Batting filler. The batting filler shall be aramid fiber, needled to produce a finished felt that has both compactness and cohesion. The finished batting shall be made of fiber only, with

* 3.2 First article. When specified, the contractor

no added resins or materials of any kind. The physical requirements of the needled batting shall be as specified in Table I when tested as specified in 4.4.1 and 4.5. The aramid fiber shall be any dyed or natural color, nominal 2 denier, 1-1/2 to 2 inches (3.81 to 5.09 cm) length.

TABLE I - Physical requirements for the needled batting filler

Weight, oz/yd^2 (g/m^2)		Thickness in inches at 0.01 lbs./sq inch		Compressional recovery (percent minimum)
Min.	Max.	Min.	Max.	
6.5 (220.4)	8.5 (288.2)	0.25	0.33	80

* 3.3.1.1 Evenness of the batting. The eveness of the batting shall be to the degree that no single determination shall deviate more than 0.6 oz/sq yard from the mean of 5 specimens when tested as specified in Table IV.

* 3.3.2 Cloth, outer covering. The outer covering for both sides shall be cloth conforming to MIL-C-43774, except that the durable antistatic finish is not required (see 6.5); and the color shall be natural.

* 3.3.3 Thread. The thread used for the needle and bobbin in the fabrication of the quilted batting shall be nylon conforming to Type I, Class A, Size A of V-T-295.

* 3.3.3.1 Color. Unless otherwise specified, the color of the thread used for the needle and bobbin shall approximate the shade of outer covering. Colorfastness requirements of V-T-295 shall not apply.

* 3.4 Construction. The quilted batting shall be composed of one layer of needled batting filler specified in 3.3.1, stitched between two layers of cloth outer covering specified in 3.3.2.

* 3.4.1 Cloth alignment. The cloth fabric coverings and the needled batting filler shall be so positioned as to yield a straight edge on one side of the ensemble. The needled batting filler shall be flush or extend beyond the selvages on both sides of the ensemble. Any

extension of the needled batting filler on the straight edge shall not exceed 1/2 inch (12.7 mm) wide while the extension of the needled batting filler on the opposite side shall not exceed 1 inch (2.54 cm). The extending edges of the needled batting filler shall be evenly trimmed without ragged edges.

* 3.4.2 Stitching and stitch pattern. All stitching shall conform to Type 301 of FED-STD-751. The stitch pattern shall be dumbbell pattern as shown in Figure 1. The stitch pattern shall contain 6 to 8 stitches per linear inch (2.54 cm), calculated as 1/6 of the total number of stitches in a 6 inch (15.24 cm) repeat of the stitching pattern.

* 3.4.2.1 Thread breaks and open stitching. Thread breaks or open stitches shall be secured by stitching back of the break in conformance with the pattern not less than 1 inch (2.54 cm). Thread ends shall be trimmed to 1/2 inch or less in length.

* 3.4.2.2 Bobbin changes. Interruptions in the rows of quilting stitches due to bobbin changes may be repaired (see 3.4.2.1). Any area of bobbin change not repaired shall be removed from the piece by cutting across the width of the piece and shall not be furnished to the Government.

* 3.5 Dimensional stability. The finished quilted batting shall not shrink or elongate more than 7.5 percent in the warp direction or 5.0 percent in the filling direction when tested as specified in 4.5.

* 3.6 Fiber identification. The quilted batting shall be labeled or ticketed for fiber content in accordance with the Rules and Regulations Under the Textile Fiber Products Identification Act.

* 3.7 Length and put-up. The quilted batting shall be furnished in rolls with a minimum length of 20 yards (18.28 m), with a maximum of one fabric splice (joining of fabric outer covering) and a maximum of one lap or otherwise joining of ends of needled batting filler, and without areas evidencing unrepaired bobbin changes. With regard to splicing the outer fabric, only one splice is allowed (i.e., one splice on each side of the outer fabric is not permitted). The outer fabrics are overlapped with-out a seam and are attached with the dumbbell quilting stitches. No overlap of the batting filler shall exceed 4 inches (10.16 cm) in length at any point. No gaps in the batting filler shall be permitted. No fabric splice shall be less than 3 yards from the ends of the roll. The minimum width shall be as specified (see 6.2).

* 3.8 Workmanship. The finished quilted batting shall conform to the quality 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 (examination and tests) 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 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 this Specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

* 4.1.1 Responsibility for compliance. All items must meet all requirements of Section 3 and 5. The inspection set forth in this Specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the Specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements; however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.1.2 Certificate of compliance. Where certificates of compliance are submitted, the Government reserves the right to check the tests of such items to determine the validity of the certification.

4.2 Classification of inspection. The inspection requirements specified herein are classified as follows:

1. First article inspection (see 4.3).
2. Quality conformance inspection (see 4.4).

4.3 First article inspection. When required (see 6.2), the first article submitted in accordance with 3.3 shall be visually inspected for color, finish and appearance and shall be tested for chemical and physical properties in accordance with the applicable 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.

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 procurement documents. In addition, the contractor shall furnish a certificate of compliance for the batting filler requirements of 3.3.1, except those listed in Table I.

* 4.4.2 Examination of the end item. The required yardage shall be examined on one side only (alternating every other roll) and defects classified in accordance with Table II. The defects found during this examination shall be counted regardless of their proximity to each other, except where two or more defects represent a single local condition of the batting, in which case only the more serious defect shall be counted. A continuous defect shall be counted as one defect for each lengthwise yard or fraction thereof in which it occurs. The sample unit shall be one linear yard of batting. The sample size shall be based upon inspection Level II of MIL-STD-105. The sample size and the lot size shall be expressed in units of one yard each. The number of rolls from which the sample is to be selected shall be in accordance with Table III. The Acceptable Quality Level (AQL) shall be 2.5 major and 6.5 total defects (major and minor combined) per 100 units (yards).

* 4.4.2.1 Intermediate inspection. The unquilted needled batting shall be examined prior to fabrication in accordance with applicable provisions of 4.4.2 and 4.4.3.

TABLE II - Examination for visual defects

Examine	Classification Major	Minor
MATERIALS		
A. Needled batting filler		
1. Any hole, cut or break (tear)	X	
2. Crease or wrinkle, embedded	X	
3. Batting uneven - resulting in thin, thick, or weak place, clearly visible	X 1/	
4. Spot or stain, clearly visible		X 1/
B. Outer cloth coverings		
1. Material not as specified	X	
2. Color not as specified	X	
3. Smash, any	X	

TABLE II - Examination for visual defects

Examine	Classification Major	Minor
4. Cut, hole or tear, any	X	
5. Spot or stain, clearly visible		X 2/
6. Abrasion resulting in any weak place	X	
7. Floats and skips:		
a. Multiple, 3/4 inch (19.05 mm) or more in combined warp and filling directions	X	
b. Multiple, less than 3/4 inch (19.05 mm) in length, in combined warp and filling directions, or single float or skip extending over more than one warp-wise or filling-wise inch (2.54 cm)	X	
8. Broken or missing yarns (warp and filling):		
a. Three or more adjacent, regardless of length	X	
b. Two or more adjacent, missing for 1 inch (2.54 cm) or more	X	
c. Two or more adjacent, missing for less than 1 inch (2.54 cm)		X
d. Single missing 4 inches or more	X	
9. Crease or wrinkle, embedded	X	
10. Five or more kinks, knots or loops in 9 linear (22.86 cm) inches, clearly visible and protruding from surface of cloth		X 2/
11. Any tight warp section resulting in waviness or dimensional distortion of cloth	X	
12. Any cut, broken, torn, folded or rolled selvage	X	
13. Any stringy, tight or slack selvage		X
C. Thread		
Not color specified or not within established tolerances		X
D. Workmanship		
Quilted batting		
a. Pattern not as specified	X	
b. Stitching pattern not within established tolerances by 1/4 inch (6.35 mm) or less		X
c. Stitching pattern not within established tolerances by more than 1/4 inch (6.35 mm)	X	

TABLE II - Examination for visual defects

Examine	Classification Major	Minor
d. Thread ends not trimmed to 1/2 inch or less		X
e. One or more rows of stitching omitted	X	
f. Needle chews	X	
g. Loose or irregular tension		X
h. Not stitch Type 301 throughout	X	
i. Broken or missing stitch 1 inch (2.54 cm) or more (not repaired)	X	
j. Broken or missing stitch less than 1 inch (2.54 cm) (not repaired)		X
k. Stitches per inch:		
(1) One stitch less than or one stitch more than specified		X
(2) Two or more stitches less than the minimum or more than the maximum specified	X	
l. Repaired thread breaks or open stitches stitched back less than 1 inch (2.54 cm)		X
m. Gaps or bare area in batting filler material	X	
n. Overlapping of batting filler exceeding 4 inches in length at any one point		X
o. Batting filler extends more than 1/2 inch on straight edge for more than 6 inches	X	
p. Batting filler extends more than 1/2 inch on straight edge for less than 6 inches		X
q. Batting filler recessed more than 1/2 inch on straight edge	X	
r. Constructed batting exhibits overall unevenness containing cloth distortions or bulges		X
s. Any area evidencing unrepaired bobbin change	X	
E. Fiber content label		
Quilted batting		
a. Fiber content label missing		X
b. Illegible or wrong text		X

1/ At normal inspection distance (approximately 3 feet [0.9 m]) when viewed against a black background.
2/ At normal inspection distance (approximately 3 feet [0.9 m]).

4.4.3 Overall examination. Each defect listed below shall be counted not more than once in each complete roll examined. The sample unit for this examination shall be one roll. The sample size (number of rolls selected as sample) for this examination and the number of defects acceptable shall be as shown in Table III.

Overall defects

Needled batting filler and quilted batting	- Overall uncleanness - Edges of batting not evenly trimmed
Needled batting filler	- Width edge to edge less than minimum specified - More than one lap or otherwise joining of ends of needled batting filler - Not needled as specified
Quilted batting	- Without a straight edge on one side of ensemble - Minimum width as measured on basis of cover cloths, less than specified - More than one fabric splice (joining of outer covering) - Fabric splice less than three yards (2.74 m) from the end of roll - Minimum length less than specified

4.4.4 Examination for length of individual roll. The roll shall be examined for gross length. Any gross length found to be less than the specified minimum or more than the specified maximum shall be scored a defect. The sample unit for this examination shall be one roll. The number of rolls selected as sample (same size) and the acceptance number for this examination shall be in accordance with Table III.

TABLE III

Lot size in yards	Sample size in rolls	Maximum number of defects acceptable in samples
Up to and including 1,300 1/	3	0
1,301 up to and including 3,200	5	0
3,201 up to and including 8,000	7	0
8,001 up to and including 22,000	10	0
22,001 up to and including 110,000	15	0
110,001 and over	25	1

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

4.4.5 Examination for total yardage in sample. The lot shall be unacceptable if the total of the actual gross lengths of the rolls in the sample is less than the total of the gross length marked on the tickets. The rolls examined shall be those selected for examination of individual rolls.

4.4.6 Examination of packaging requirements. An examination shall be made in accordance with the provisions of PPP-P-1133 to determine whether packaging, packing, and marking comply with the Section 5 requirements.

* 4.5 Testing of the end item. 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 apply to the average of determinations made on a sample unit for test purposes as specified in the applicable test method. All test reports shall contain the individual values utilized in expressing the final result. The lot shall be unacceptable if one or more sample units fail to meet any test requirements specified. The lot size shall be expressed in units of one yard (.9 m). The sample size (number of sample units) shall be in accordance with the following:

Lot size (yards)	Sample size
800 or less	1
801 up to and including 22,000	2
22,001 and over	2.5

NOTE: To change yard to meters, multiply the yards by .914.

The sample unit for testing the needled filler and the finished quilted batting shall be as follows:

Item tested	Sample unit
Batting filler material	1 yard (.9 m)
Quilted batting	2-1/2 yards (2.28 m)

TABLE IV - Test methods

Characteristics	Requirement Paragraph	Test Method
Needled batting filler:		
Weight/oz/sq yd	Table I	ASTM-D 3776 (Opt C) 1/
Thickness in inches @ 0.01 psi	Table I	4.5.1 1/
Compressional recovery, %	Table I	4.5.2 1/
Evenness of the batting ($oz/sq\ yd^2$)	3.3.1.1	ASTM-D 3776 (Opt C) 2/
Quilted batting:		
Dimensional stability		
Warp and filling	3.5	4.5.3

1/ Test specimen shall be allowed to relax on a flat surface without pressure for a minimum of 24 hours, until equilibrium with standard conditions are reached, prior to subjection to tests.

2/ For the evenness test, the weight shall be determined by using an 8x8 inch specimen.

4.5.1 Determination of thickness. Thickness of the batting filler shall be determined in accordance with the method specified in 4.5.2.3 for "Initial thickness of specimen."

4.5.2 Determination of compressional recovery.

4.5.2.1 Preparation of specimen. The specimen shall be cut from different parts of a full width sample and shall measure not less than 6 inches by 6 inches. The specimen shall always be larger than the pressure foot on the test apparatus.

4.5.2.2 Apparatus. The test apparatus shall consist of a base plate and a circular pressure plate with a bearing surface of 20 square inches, and a means of applying 0.01 and 5.0 pounds per square inch loading on the sample. This pressure shall be evenly distributed over the 20 square inch area. The thickness measuring device shall be capable of measuring the thickness of the sample (distance between base and pressure plate) to an accuracy of 0.01 inch.

4.5.2.3 Procedure. The 0.01 pound per square inch pressure shall be applied to the test specimen, and the thickness reading shall be taken and recorded as "initial thickness" (see 4.5.1). Immediately after determining the initial thickness, the pressure shall be increased to 5 pounds per square inch and maintained for one minute. The pressure shall then be completely removed and the specimen shall be allowed to relax for 5 minutes. Immediately after the 5 minute relaxation period, the thickness of the specimen shall again be determined under 0.01 pound per square inch pressure and be recorded as the "thickness of the specimen after compression."

4.5.2.4 Calculation of results. The percent compressional recovery shall be determined by the following formula:

$$\text{Percent compressional recovery} = \frac{\text{Thickness of specimen after compression}}{\text{Initial thickness of specimen}} \times 100$$

The percent compressional recovery shall be determined from five specimens and the results averaged and recorded to the nearest one (1) percent.

4.5.3 Determination of dimensional stability of quilted batting. The specimens of the quilted batting shall be prepared for dimensional stability in accordance with the woven or warp knitted cloth procedure, and laundered and tested in accordance with the cotton laundering procedure specified in test method 5556, except as follows:

(a) The specimens shall be marked on one layer of the outer cover cloth in the warp (length) and filling (width) directions.

(b) The specimens shall not be pressed.

(c) The specimens shall be smoothed by hand to obtain maximum smoothness before marking and measuring.

(d) The specimens shall be stitched on all four sides, one inch in from the side. The specimen shall be subjected to three completed procedures prior to evaluation.

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 quilted batting shall be put-up and packaged in accordance with the applicable requirements of PPP-P-1133.

5.2 Packing. Packing shall be Level A, B, or C as specified (see 6.2).

5.2.1 Levels A, B, and C. Quilted batting 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 PPP-P-1133.

6. NOTES

* (This Section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The quilted batting covered by this Specification is intended for use in insulating liners in firefighter's aluminized proximity clothing.

* 6.2 Ordering data. Procurement documents should specify the following:

(a) Title, number, and date of this Specification.
(b) When first article is required (see 3.2). The item will be tested and should be a first article sample. The Contracting Officer should include specific instructions in acquisition documents regarding arrangement for examinations, quantity, and testing and approval of the first article.
(c) Color of outer cloth and thread required (see 3.3.2 and 3.3.3.1).
(d) Width required (see 3.7).
(e) Selection of applicable levels of put-up packaging and packing (see 5.1 and 5.2).

* 6.3 Width of batting filler. It is recommended that the width of batting filler be ordered three inches wider than the outer fabric.

* 6.4 Changes from previous issue. The margins of this Specification 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.

* 6.5 Fiber identification requirements. As an alternate to 3.3.2, the fiber identification requirements can also be met with nomex types 450 and 455 aramid fiber manufactured by E.I. Dupont DeNemours & Company, Wilmington, DE (see 3.3.2).

6.6 Subject term (key word) listing.

Aramid
Batting
Flame resistant
Protective
Quilted

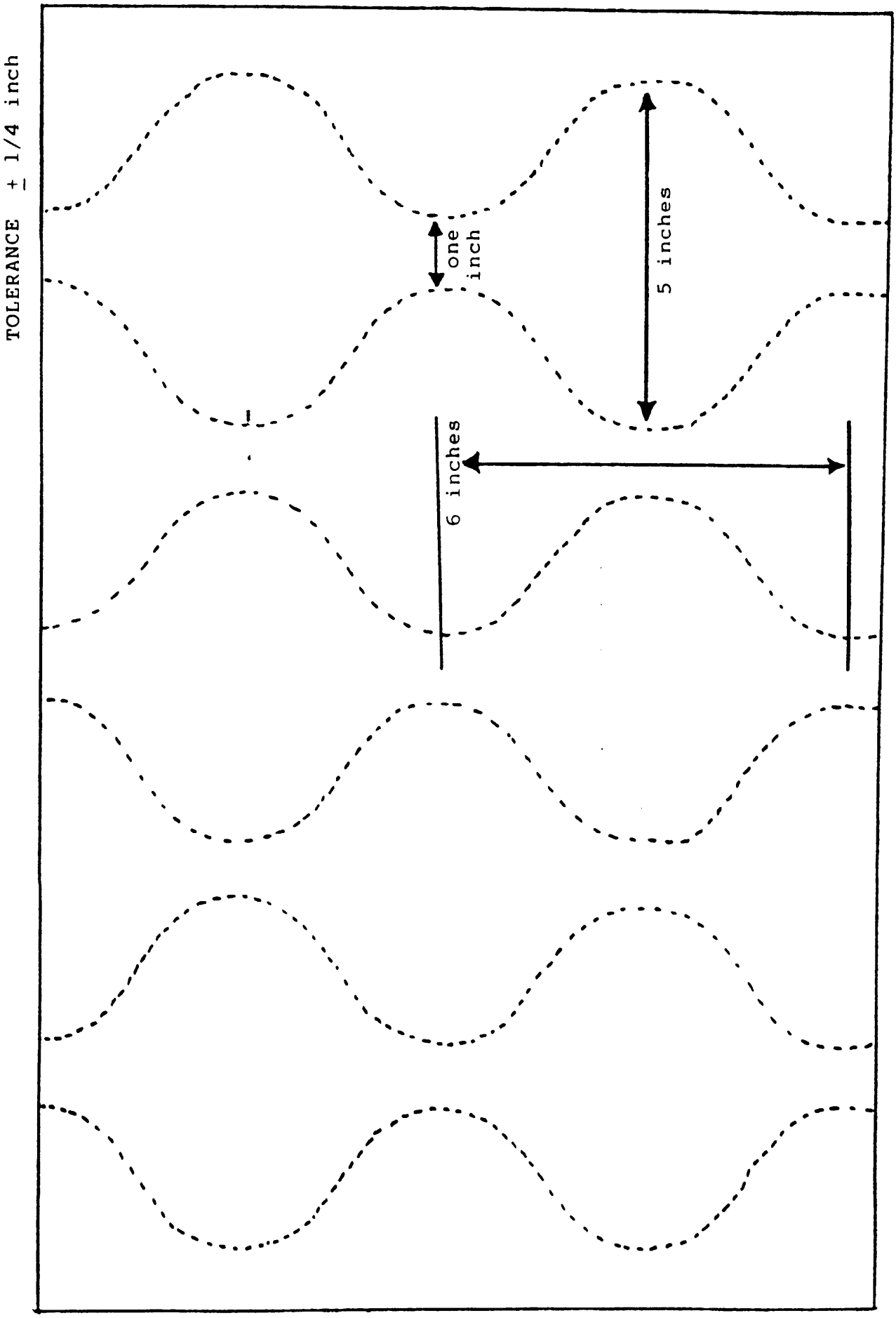
Custodians:
Navy - NU
Air Force - 99

Review Activities:
Navy - SH
* Air Force - 45, 82

User Activities:
Navy - MC

Preparing Activity:
DLA - CT

Project No.
8320 - 0101



STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER	2. DOCUMENT DATE (YYMMDD)
	MIL-B-87002C	93-12-10

3. DOCUMENT TITLE: BATTING, SYNTHETIC FIBERS, QUILTED, ARAMID

4. NATURE OF CHANGE (*Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.*)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (*Last, First, Middle Initial*)	b. ORGANIZATION	
c. ADDRESS (*Include Zip Code*)	d. TELEPHONE (*Include Area Code*) (1) Commercial (2) AUTOVON (*If applicable*)	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME	b. TELEPHONE (*Include Area Code*)	
DLA-CT	(1) Commercial: (215) 737-8105	(2) AUTOVON: 444-8105
c. ADDRESS (*Include Zip Code*) DEFENSE PERSONNEL SUPPORT CENTER DPSC-FSSD (Bldg. 12-3-D) 2800 South 20th Street, PHILA, PA 19101	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	

DD Form 1426, OCT 89 — *Previous editions are obsolete.*