

MIL-B-81813B

8 April 1975
SUPERSEDING
MIL-B-81813A
1 October 1971
(See 6.6)

MILITARY SPECIFICATION

* **BATTING, ARAMID OR NOVOLOID FIBER, QUILTED**

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

1. SCOPE

1.1 This specification covers the requirements for one type of quilted batting.

* 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-1133 - Packaging and Packing of Synthetic Fiber Fabrics

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MIL-C-43774 - Cloth, Plain or Pajama Check Weave, Nylon, Non-Melting

STANDARDS

FEDERAL

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

FSC 8320

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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.)

LAWS 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 The requirements specified in 3.3.1, 3.3.2.2, and 3.4.1 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 for an end item by a supplier, and to batting purchased directly by the Government.

3.2 Materials.

- * 3.2.1 Batting filler. The batting filler shall be of either an approved aramid fiber or an approved novoloid fiber (see 6.4) needed for compactness and cohesion. The aramid fiber shall be virgin, natural or solution dyed color, nominal 2 denier, 1-1/2 to 2 inch length. The novoloid fiber shall be virgin and in the natural color as produced. The finished batting shall be made of fiber only, with 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 4.2.7.

TABLE I. Physical requirements for the needled batting filler

Weight per square yard - ounces		Thickness in inches at 0.01 lb/sq.in.	Compressional recovery, (percent minimum)
<u>Minimum</u>	<u>Maximum</u>		
3.8	- 4.8	0.22 - 0.30	75

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- * 3.2.2 Cloth outer covering. The outer covering for the quilted batting shall be non-melting cloth conforming to MIL-C-43774. The color shall be natural, Olive Green 106 or Sage Green 1565 as specified (see 6.2)).
- * 3.2.3 Thread. The thread used for the needle and bobbin in the fabrication of the quilted batting shall be made of an approved aramid spun fiber (see 6.4). The physical requirements for the thread shall be as specified in table II when tested as specified in 4.2.1.

TABLE II. Physical requirements for the aramid thread

Yarn size (approximate)	Ply	Direction of final twist	Yards/lb. (minimum)	Single strand breaking strength lbs. (minimum)
45/3	3	Z	11,000	2.0

- * 3.2.3.1 Color. The color of the thread shall be Olive Drab S-1 (C.A. 66022) or Sage Green AD (C.A. 66046) as specified (see 6.2).
- * 3.2.3.1.1 Colorfastness. Thread shall show fastness to light and to laundering equal to or better than the standard sample when tested as specified in 4.2.1. When determining colorfastness for light, the sample shall be faded to the break point or the standard referenced sample and the suppliers submission shall be compared with the standard at this point. The suppliers submission shall show fair fastness when no standard sample is available.
- * 3.3 Construction. The quilted batting shall be composed of one layer of needled batting filler specified in 3.2.1, stitched between two layers of cloth outer covering specified in 3.2.2.
- * 3.3.1 Cloth alignment (see 3.1 and 6.5). The cloth outer coverings and 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 wide while the extension of the needled batting filler on the opposite side shall not exceed 1 inch. The extending edges of the needled batting filler shall be evenly trimmed without ragged edges.

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- * 3.3.2 Seams and stitching. All stitching shall conform to type 301 of FED-STD-751. The stitch pattern shall be the dumbbell pattern as shown in figure 1. The stitch pattern shall contain 6 to 8 stitches per linear inch, calculated as 1/6 of the total number of stitches in a 6-inch repeat of the stitching pattern.
- 3.3.2.1 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.
- 3.3.2.2 Bobbin changes (see 3.1). The area of complete bobbin changes on the quilted batting shall be cut out of the piece and shall not be furnished to the Government.
- * 3.3.3 Dimensional stability. The finished quilted batting shall show a plus or minus dimensional change not in excess of 5.0 percent in the length or width when tested as specified in 4.2.7.3.
- * 3.3.4 Fiber identification. The quilted batting shall be labeled, ticketed or invoiced for fiber content in accordance with the Rules and Regulations under the Textile Fiber Products Identification Act.
- 3.4 Length and put-up.
- * 3.4.1 Quilted batting (see 3.1 and 6.5). The quilted batting shall be furnished in rolls with a minimum length of 20 yards, 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 complete bobbin changes. A complete bobbin change would require all bobbins would have to be changed at one time. 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 without a seam and are attached with the dumbbell quilting stitching. No overlap of the batting filler shall exceed 4 inches 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).
- 3.5 Workmanship. The finished quilted batting shall be clean, free from objectionable odor and 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.

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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.

* 4.1.1 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 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. In addition, testing shall be performed on components and materials listed in table III. The method of testing in FED-STD-191, wherever applicable, and as specified herein shall be followed. The lot shall be unacceptable if one or more sample units fail to meet any test requirements specified.

TABLE III. Component tests

Material	Characteristics	Requirement paragraph	Test method
Batting filler fiber: (see table VI, adulterants)	Denier	3.2.1	<u>1/</u> 4021
	Color	3.2.1	<u>2/</u> Visual
	Length of staple	3.2.1	<u>1/</u> <u>3/</u>
	Material identification	3.2.1	<u>1/</u>

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TABLE III. Component tests (cont'd)

<u>Material</u>	<u>Characteristics</u>	<u>Requirement paragraph</u>	<u>Test method</u>
Thread:	Spun fiber	3.2.3	<u>2/</u> Visual
	Material identification	3.2.3	<u>1/</u>
	Number of plies	3.2.3	<u>2/</u> Visual
	Direction of twist	3.2.3	<u>2/</u> 4050
	Yards/lb	3.2.3	<u>2/</u> 4010
	Breaking strength (single strand), lbs.	3.2.3	<u>2/</u> 4100
	Colorfastness to light	3.2.3.1.1	<u>2/</u> <u>4/</u> 5660
	Colorfastness to laundering	3.2.3.1.1	<u>2/</u> 5610

- 1/ A certificate of compliance is mandatory for this requirement, and it shall include: A certified statement that the fiber used is that specified in 3.2.1 and 3.2.3 along with the fiber supplier's type and identification data, and supported by a certified copy of the fiber producer's certification to the manufacturer of quilted batting.
- 2/ The supplier shall submit a certificate of compliance for this characteristic. When required, the certificate shall be accompanied by actual test, inspection, or other verifiable data.
- 3/ Scale to the nearest 1/16 inch.
- 4/ Except that the supplier's submission shall be compared with the standard sample after 6 hours and evaluation made at this point.

- * 4.2.2 Examination of end item for visual defects. The required yardage shall be examined on one side only (alternating every other roll) and defects classified in accordance with table IV. The defects found during this

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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 V. The acceptable quality level (AQL) shall be 4.0 major and 10.0 total defects (major and minor combined) per 100 units (yards).

4.2.2.1 Intermediate inspection. The unquilted needled batting shall be examined prior to fabrication in accordance with applicable provisions of 4.2.2 and 4.2.3.

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TABLE IV. Examination for visual defects

Examine	Defect	Classification	
		Major	Minor
Materials:			
Needled batting filler	Any hole, cut or break (tear)	X	
	Crease or wrinkle, embedded	X	
	Batting uneven - resulting in thin, thick or weak place, clearly visible <u>1/</u>	X	
	Spot or stain, clearly visible <u>1/</u>		X
Outer cloth coverings	Material not as specified	X	
	Color not as specified	X	
	Smash, any	X	
	Cut, hole or tear, any	X	
	Spot or stain, clearly visible <u>2/</u>		X
	Abrasion resulting in any weak place	X	
	Floats and skips:		
	Multiple, 3/4 inch or more in combined warp and filling directions	X	
Multiple, less than 3/4 inch in length in combined warp and filling directions, or single float or skip extending over more than one warp-wise or filling-wise inch		X	

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TABLE IV. Examination for visual defects (cont'd)

Examine	Defect	Classification	
		Major	Minor
Materials: (cont'd)			
Outer cloth coverings (cont'd)	Broken or missing yarns (warp and filling):		
	Three or more contiguous, regardless of length	X	
	Two or more contiguous missing for 1 inch or more		X
	Two or more contiguous missing for less than 1 inch		X
	Single missing four inches or more	X	
	Crease or wrinkle, embedded	X	
	Five or more kinks, knots or loops in 9 linear inches, clearly visible $\frac{2}{4}$ and protruding from surface of cloth		X
	Any tight warp section resulting in waviness or dimensional distortion of cloth	X	
	Any cut, broken, torn, folded or rolled selvage	X	
	Any stringy or loopy, scalloped, tight or slack selvage		X
	Thread	Not color specified or not within established tolerances	
Workmanship:			
Quilted batting	Pattern not as specified	X	
	Stitching pattern not within established tolerances by $\frac{1}{4}$ inch or less		X
	Stitching pattern not within established tolerances by more than $\frac{1}{4}$ inch	X	
	Thread ends not trimmed		X
	One or more rows of stitching omitted	X	

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* TABLE IV. Examination for visual defects (cont'd)

Examine	Defects	Classification	
		Major	Minor
Workmanship: (cont'd)			
Quilted batting (cont'd)	Needle chews	X	
	Loose or irregular tension		X
	Not stitch type 301 throughout	X	
	Broken or missing stitch 1 inch or more (not repaired)	X	
	Broken or missing stitch less than 1 inch (not repaired)		X
	Stitches per inch -		
	One stitch less than or one stitch more than specified		X
	Two or more stitches less than the minimum or more than the maximum specified	X	
	Any area evidencing complete bobbin change.	X	
	Repaired thread breaks or open stitches stitched back less than 1. inch		X
	Gaps or bare area in batting filler material	X	
	Overlapping of batting filler exceeding four inches in length at any one point		X
	Batting filler recessed or extends more than 1/2 inch on straight edge	X	
	Constructed batting exhibits overall unevenness containing cloth distortions or bulges		X
Fiber content label:			
Quilted batting	Fiber content label missing; illegible or wrong text		X

1/ At normal inspection distance (approximately 3 feet) when viewed against a black background.

2/ At normal inspection distance (approximately 3 feet).

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4.2.3 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 V.

	<u>Overall defects</u>
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
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 from the end of roll - Minimum length less than specified

4.2.4 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 (sample size) and the acceptance number for this examination shall be in accordance with table V.

TABLE V.

<u>Lot size in yards</u>	<u>Sample size in rolls</u>	<u>Maximum number of defects acceptable in samples</u>
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.

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4.2.5 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.

* 4.2.6 Examination of preparation for delivery 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.

4.2.7 Testing of the end item. The methods of testing specified in FED-STD-191, wherever applicable and as listed in table VI 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. 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

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

<u>Item tested</u>	<u>Sample unit</u>
Batting filler material	1 yard
Quilted batting	2-1/2 yards

TABLE VI. Test methods

<u>Characteristics</u>	<u>Require- ment para- graph</u>	<u>Test method</u>	<u>Number of deter- minations per sample unit</u>	<u>Results reported as</u>
Needled batting filler: Weight, oz/sq.yd.	3.2.1	5041 <u>1/</u> <u>2/</u>	5	Average of 5 determinations to nearest 0.1 oz/sq. yd.

TABLE VI

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TABLE VI. Test methods

Characteristics	Requirement paragraph	Test method	Number of determinations per sample unit	Results reported as
Thickness in inches @ 0.01 psi	3.2.1	4.2.7.1 <u>2/</u>	5	Average of 5 determinations to nearest 0.001 inch
Compressional recovery, %	3.2.1	4.2.7.2 <u>2/</u>	5	Average of 5 determinations to nearest 0.1 percent
Quilted batting:				
Dimensional stability:				
Warp direction (length)	3.3.3	4.2.7.3	3	Average of 3 determinations to nearest 0.1 percent
Filling direction (width)	3.3.3	4.2.7.3	3	Average of 3 determinations to nearest 0.1 percent
Adulterants	3.2.1	<u>3/</u>	-	Pass or fail

1/ No one of the five specimen determinations shall be less than 3.8 nor greater than 4.8 ounces per square yard.

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

3/ The supplier shall submit a certificate of compliance certifying that the finished batting, except for the thread, is made entirely of aramid or novoloid fiber with no added resins or other materials of any kind.

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4.2.7.1 Determination of thickness. Thickness of the batting filler shall be determined in accordance with the method specified in 4.2.7.2 for "Initial thickness of specimen".

4.2.7.2 Determination of compressional recovery.

4.2.7.2.1 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 specimens shall always be larger than the pressure foot on the test apparatus.

4.2.7.2.2 Apparatus. The test apparatus shall consist of a base plate and a circular pressure plate with a bearing surface of 20 square inches, and 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.

4.2.7.2.3 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 4.2.7.1). Immediately after determining the initial thickness, the pressure shall be increased to 5 lbs. 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 minutes relaxation period, the thickness of the specimen shall again be determined under 0.01 pound per sq. inch pressure and be recorded as the "thickness of the specimen after compression".

4.2.7.2.4 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 0.1 percent.

4.2.7.3 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 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.

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(b) The specimens shall not be pressed.

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

The samples shall be subjected to three complete procedures prior to evaluation.

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 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.

5.3.1 Precautionary marking. In addition to the marking specified, the following precautionary marking, in letters not less than 3/4 inch in height, shall appear at least on one side and wherever practicable on two sides of each shipping container:

DO NOT STAND ON END

6. NOTES

6.1 Intended use. The quilted batting covered by this specification is intended for use in insulating liners.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Width required (see 3.4.1).
- (c) Type of batting filler fiber required (see 3.2.1).
- (d) Color of outer cloth and thread required (see 3.2.2 and 3.2.3.1).
- (e) Selection of applicable levels of put-up and packaging and packing (see 5.1 and 5.2).

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6.3 Standard sample. For access to a standard sample of aromatic nylon (Nomex) thread, address the procuring office issuing the invitation for bids.

6.4 Fiber identification. The requirements of the batting are based on materials made from (a) "Nomex" aramid fiber manufactured by E. I. duPont deNemours and Company, Wilmington, DE and (b) "Kynol" novoloid fiber manufactured by American Kynol, Inc., Carborundum Center, Niagara Falls, NY.

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

6.6 Supersession data. This specification supersedes the requirements of MIL-B-81813 A, Batting, Quilted, Aromatic Polyamide High Temperature Resistant, dated 1 October 1971 and LP/P DES 46-70A, Batting, Non-Melting: Quilted, dated 27 November 1973.

6.7 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 relations to the last previous issue.

Custodians:

Army - GL
Navy - AS
Air Force - 11

Preparing activity:

Army - GL
Project No. 8320-0073

Review activities:

Army - MD
Navy - SA

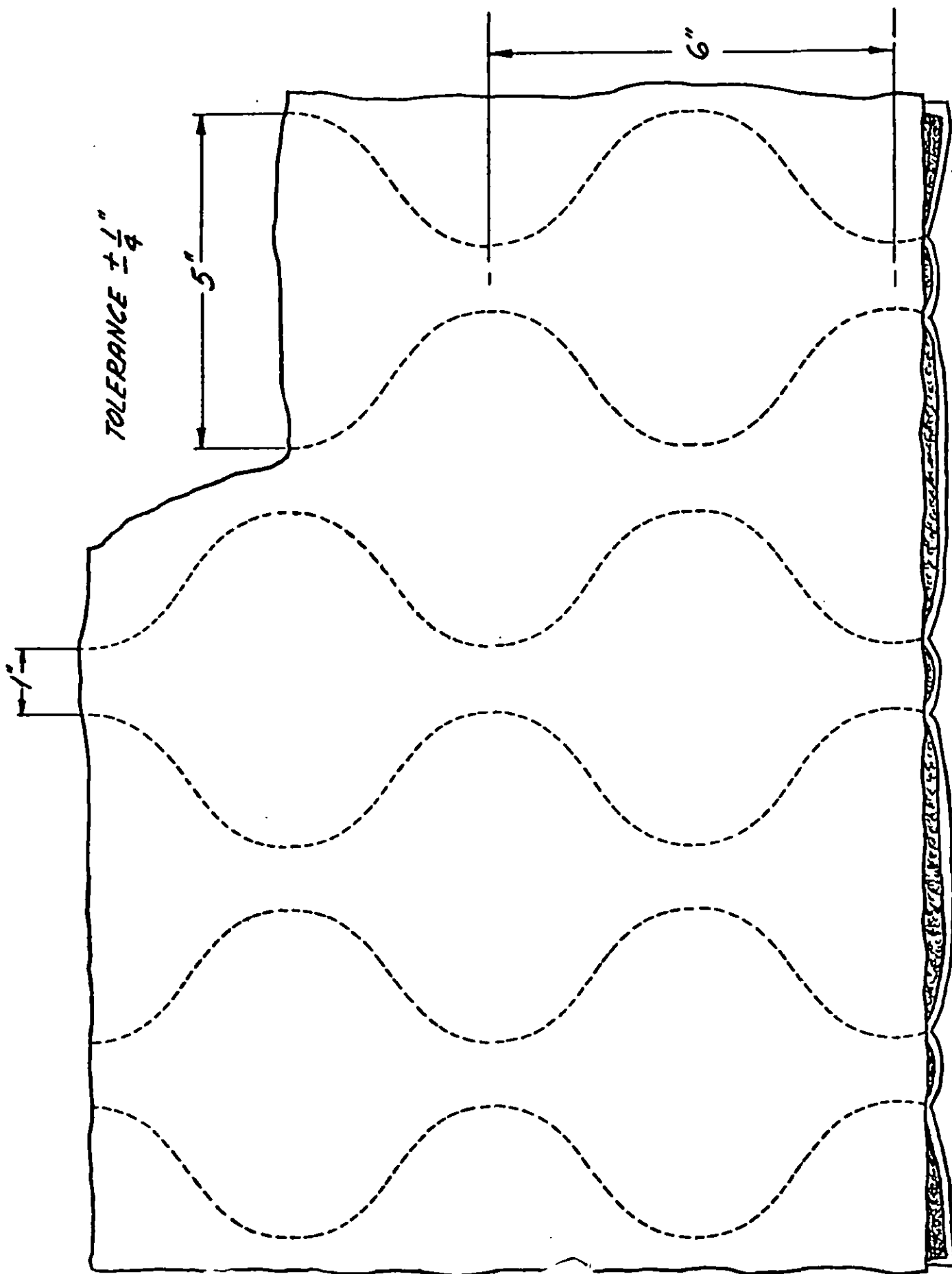


FIG 1 DUMBELL PATTERN