

INCH-POUND

MIL-PRF-32567

13 January 2017

PERFORMANCE SPECIFICATION

BATTING, SYNTHETIC FIBERS, UNQUILTED

This document is approved for use by all Departments and Agencies of the Department of Defense (DoD).

1. SCOPE

1.1 Scope. This specification covers unquilted synthetic fiber batting for insulation in environmental protective clothing and equipment.

1.2 Classification. This specification covers the following types and classes.

1.2.1 Types and Classes.

Type I: Basic cut staple or continuous filament batting

- Class 1 - 2.2 ounces per square yard
- Class 2 - 4.0 ounces per square yard
- Class 3 - 4.4 ounces per square yard
- Class 4 - 6.0 ounces per square yard
- Class 5 - 10.0 ounces per square yard

Type II: High performance weight continuous filament batting

- Class 1 - 2.2 ounces per square yard
- Class 2 - 3.3 ounces per square yard
- Class 3 - 3.6 ounces per square yard

<p>Comments, suggestions, or questions on this document should be addressed: ATTN: DLA Troop Support, 700 Robbins Avenue, Philadelphia, PA 19111-5096. Since contact information can change, you may want to verify the currency of the address information using Acquisition Streamlining and Standardization Information System (ASSIST) online database https://assist.dla.mil/.</p>

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Type III: High performance thickness cut staple batting.

Class 1	- 2.0 ounces per square yard (68 grams/square meter)
Class 2	- 2.4 ounces per square yard (80 grams/square meter)
Class 3	- 3.9 ounces per square yard (133 grams/square meter)
Class 4	- 5.9 ounces per square yard (200 grams/square meter)

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in Sections 3, and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in Sections 3, and 4 of this specification whether or not they are listed.

2.2 Government documents.

2.2.1 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 are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-C-43637 - Cloth, Plain Weave, Ripstop, Nylon

(Copies of these documents are available online at <http://quicksearch.dla.mil>.)

2.2.2 Other Government documents, drawings and publications. The following other Government documents, drawings and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation or contract.

FEDERAL TRADE COMMISSION (FTC)

Rules and Regulations Under the Textile Fiber Products Identification Act

(Copies are available online at <http://www.ftc.gov>)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AMERICAN ASSOCIATION OF TEXTILE CHEMIST AND COLORISTS (AATCC)

AATCC Test Method 20 - Fiber Analysis: Qualitative

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AATCC Test Method 135 - Dimensional Changes of Fabrics after Home Laundering

(Copies are available on line at <http://www.aatcc.org>.)

AMERICAN SOCIETY FOR QUALITY (ASQ)

ANSI/ASQ Z1.4 – Sampling Procedures and Tables for Inspection by Attributes

(Copies are available online at <http://www.asq.org>)

ASTM INTERNATIONAL

- | | |
|-------------------|---|
| ASTM C518 | - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus |
| ASTM D1776/D1776M | - Standard Practice for Conditioning and Testing Textiles |
| ASTM D1907/D1907M | - Standard Test Method for Linear Density of Yarn (yarn Number) by Skein Method |
| ASTM D5103 | - Standard Test Method for Length and Length Distribution of Manufactured Staple Fibers (Single-Fiber Test) |

(Copies of documents are available online at <http://www.astm.org>.)

OTHER PUBLICATIONS

Repeat Insult Patch Test – Modified Draize Procedure –
Principles and Methods of Toxicology, A Wallace Hayes (editor).

(Copies are available on-line at <http://www.taylorandfrancis.com/> or <https://crcpress.com>)

Photographic Standards for Fiberfill Durability Ratings

(Copies are available online at <http://www.Techstreet.com>.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document however, supersedes applicable laws and regulations unless a specified exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.2.

3.2 Recycled, recovered, or environmentally preferable materials. Recycled, recovered or environmentally preferable materials should be used to the maximum extent possible, provided the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

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3.3 Figures. Figures 1 and 2 are furnished for informational purposes only. To the extent of any inconsistencies between the written document and the figure, the written document shall govern.

3.4 Material

3.4.1 Basic material. The batting fibers shall be 100 percent polyester in the natural undyed color. The use of any form of polyester waste is prohibited, e.g., undrawn fiber, mixtures of deniers, lusters or cross sections, and waste from any stage of fiber production; whether drawn, undrawn or mixed or garnetted fibers.

3.4.1.2 Type I, Classes 1 and 2 fiber. The polyester fiber shall be 4.0 to 6.0 denier, 2 ($\pm 1/8$)-inch long, crimped cut staple (Class 1 and 2).

3.4.1.3 Type I, Classes 3, 4, and 5 fiber. The polyester fiber shall be hollow cut staple. The polyester fiber shall be hollow, drawn, crimped, cut staple, 5.25 to 6.0 denier, and 2.0 to 2.5-inch long or continuous filament, 3.5 – 6.0 denier.

3.4.1.4. Type II fiber (all Classes). Type II batting material utilizes hollow crimped continuous polyester filament having a denier per filament of 2 to 2.5 with a minimum void of 15 percent.

3.4.1.5 Type III fiber (all Classes). Type III batting consists of a mixture of hollow and staple fibers from 2 to 2.5-inch long and denier range from 0.7 to 1.0. The majority of the fibers shall be 1.0 denier with a silicon finish.

3.5 Batting fabrication (all Types). The batting shall be a nonwoven construction using polyester fiber as specified in 3.4.1. The fibers shall be well opened without excessive breakage, or neps. Continuous filament fiber used in Type I and Type II shall be fabricated with an overlap construction which will result in some overlapped thicker bands which shall comply with the evenness requirement specified in Table I. The finished batting class specified shall meet the requirements in 3.4 when tested as specified in Table III.

3.5.1 Batting scrim. A spun bonded scrim may be applied to one surface of any batting type based upon end item design requirements. The scrim shall have a nominal weight of 0.4 ounces per square yard and is additional weight over the Table I batting weight for each type and class. The scrim shall maintain its structural integrity when laundered as specified in 4.7.4.2. All performance requirements in Table I includes the scrim layer except nominal weight and batting evenness requirement which is batting only. The scrim may be lightly adhered to batting if required for the end item construction.

3.5.2 Fiber proof batting cover cloth. Cloth selected to cover the batting as stated in 3.4, in end item applications must prevent batting fiber migration through the cover cloth according to 4.7.5.1.

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3.6 **Physical requirements.** The finished batting shall conform to the requirements, listed below, in Table I, when tested as specified in Table III.

TABLE I. Physical requirements.

Types	Characteristics					
	Nominal batting weight, oz./sq.yd., (±10) percent, <u>1</u> /	Batting evenness, oz./sq.yd., percent, <u>1</u> /	Nominal Thickness, inches, at 0.01 psi		Nominal Thermal Resistance, intrinsic clo	
			Initial	After 3 launderings	Initial	After 3 launderings
Type I						
Class 1	2.2	(±10)	0.29	0.15	---	---
Class 2	4.0	(±10)	0.52	0.32	---	---
Class 3	4.4	(±10)	0.49	0.42	---	---
Class 4	6.0	(±10)	0.70	0.60	---	---
Class 5	10.0	(±10)	1.00	0.85	---	---
Type II						
Class 1	2.2	(±5)	0.35	0.25	1.40	0.90
Class 2	3.3	(±5)	0.45	0.35	1.80	1.60
Class 3	3.6	(±5)	0.65	0.55	2.30	2.10
Type III						
Class 1	2.0	(±5)	0.20	0.10	1.00	0.50
Class 2	2.4	(±5)	0.22	0.11	1.10	0.65
Class 3	3.9	(±5)	0.30	0.18	1.55	1.00
Class 4	5.9	(±5)	0.50	0.20	2.30	1.20

1/ A target specific batting weight is selected from the nominal weight (± 10) percent to allow flexibility in optimizing batting weight for an end item performance. Once the target weight is selected then the batting evenness requirement becomes (± 10) percent for Type I and (± 5) percent for Type II and III of target weight to support consistent thermal resistance from the batting (see 6.10). Batting weight and evenness shall not include scrim when used for an end item application. Batting evenness is directly related to uniform thermal resistance performance to be operationally effective in insulated clothing and equipment end items.

3.6.1 **Dimensional change.** Type I, Classes 1, 2, and 3 finished battings shall have a shrinkage or elongation both in the machine and cross machine direction (length and width) after three (3) laundering cycles of not greater than 5.0 percent. For Classes 4 and 5 the finished battings shall have a dimensional change of not greater than 5.0 percent in the machine (length) and 5.0 percent in the cross (width) when tested as specified in Table III. For Type II and III (all Classes), the shrinkage or elongation both in the machine and cross machine direction after three (3) laundering cycles shall not be greater than 3.0 percent in either direction for the individual panel unit when tested as specified in Table III.

3.6.2 **Batting launderability (durability) for all Types and Classes.** The batting appearance after three (3) laundering cycles shall have a minimum averaged rating of four (4) for all batting Types and Classes when tested as specified in 4.6, Table III.

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3.7 Toxicity. The finished batting shall not present a health hazard and shall show compatibility with prolonged, direct skin contact when tested as specified in Table III. Chemicals recognized by the Environmental Protection Agency (EPA) as human carcinogens shall not be used (see 4.7.7).

3.8 Length and put-up. For Government procurements only, the batting shall be furnished in continuous lengths as specified in 6.2. Each length shall be put-up full width on a roll as specified in the contract.

3.9 Fiber identification. Each roll of finished batting shall be labeled or ticketed for fiber content in accordance with the Rules and Regulations under the Textile Fiber Products Identification Act.

3.10 Workmanship. The finished batting shall be clean, free from objectionable odor and shall conform to the quality of product established by this specification. The occurrence of defects shall not exceed the applicable acceptance quality levels.

4. VERIFICATION

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

- a. First article inspection (see 4.2).
- b. Conformance inspection (see 4.3).

4.2 First article inspection. A first article, submitted in accordance with 3.1, shall be inspected for conformance to physical requirements of Table I, examined for appearance, defects in Table II, and overall workmanship. The presence of excessive defects, as defined in the contract (see 6.2) or failure of any testing shall be cause for rejection of the first article.

4.3 Conformance inspection. Unless, otherwise specified, conformance inspection shall include the examination of 4.5 and the tests of 4.6 through 4.7 as applicable.

4.3.1 Conformance inspection samples. Sampling for inspections shall be performed in accordance with ANSI/ASQ Z1.4 and with acceptance quality limits (AQL) as specified in the contract and/or purchase order, except where otherwise indicated (see 6.2).

4.4 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with all requirements of referenced documents, unless otherwise excluded, amended, modified or qualified in this specification (see 6.2).

4.5 Visual examination. The unquilted batting shall be examined for the defects listed in Table II when inspected at a normal inspection distance of 3-feet when viewed against a black background.

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TABLE II. Visual defects.

Examine	Defect	Classification	
		Major	Minor
Hole, cut, or tear	Any hole, cut or tear	101	
Embedded, crease or wrinkle	Any crease or wrinkle clearly visible		201
Batting uneven	Uneven batting resulting in thin, thick or weak place, clearly visible <u>1/</u>	102	
Spot, stain, or streak	Any clearly visible	103	
Batting not made from well opened fibers	Resulting in a noticeable difference evenness batting, clearly visible	104	
Breakage of fibers	Excessive breakage of fibers, clearly visible	105	
Neps	Two or more in the same area, clearly visible		202
Carrier scrim	Not the full width of the batting width or hole, cut, break, or cut, not uniform	106	
Odor	Objectional odor		203
Label	Missing or incorrect		204

1/ Continuous filament batting used in Type I (Classes 3, 4, and 5) and Type II batting will demonstrate overlap bands from its cross lapped batting construction which is not a defect unless it results in unacceptable batting evenness specified in Table I.

4.6 Material and end item testing. The batting shall be tested for the characteristics listed in Table III. The methods of testing as specified wherever applicable and as listed in Table III shall be followed. All test reports shall contain the individual values utilized in expressing the final results. The sample unit shall be one (1) full width finished batting roll after packaging preparation for shipment for every 200 rolls produced and used to test all physical and chemical tests. The lot shall be unacceptable if one (1) or more sample units or the lot average fails to meet any requirements specified.

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TABLE III. Material and end item tests.

Characteristic	Requirement reference	Test method
Fiber identification	3.4.1	AATCC 20 (see 6.6)
Denier	3.4.1.2 - 3.4.1.5	ASTM D1907/D1907M
Staple length	3.4.1.2, 3.4.1.3 and 3.4.1.5	ASTM D5103
Nominal batting weight	Table I	4.7.1
Batting evenness	Table I	4.7.2
Nominal Thickness		
Initial	Table I	4.7.3
After three (3) laundering	Table I	4.7.3.1
Nominal Thermal Resistance,		
Initial	Table I	4.7.3 and 4.7.6
After three (3) launderings	Table I	4.7.3.1 and 4.7.6.1
Dimensional change		
After three (3) launderings	3.6.1	4.7.4 - 4.7.4.2
Batting launderability		
After three (3) launderings	3.6.2	4.7.5
Toxicity	3.7	4.7.7

1/ A “Pass” rating is a minimum average of four (4). If the ratings among the three (3) specimens differ by more than on (1) numerical rating value, then the sample unit shall be rated “Fail”.

4.7 Methods of inspection. All laundered batting tests can be accomplished with a single set of prepared batting panels for laundering (see 4.7.4) when testing is done in the following sequence; 4.7.4.2, 4.7.5, 4.7.3, and 4.7.6.

4.7.1 Batting weight. The specific target weight within the nominal batting weight range shall be recorded. Cut a minimum of thirty 12-inches x 12-inches ($\pm 1/8$ -inch) size specimens sampled diagonally across left side, center, and right batting width along the entire length of the roll resulting in ten (10) specimens from the left, center, and right area along the length of the roll (see Figure 2 - Batting weight specimen sampling pattern). The samples shall be conditioned in accordance with ASTM D1776/D1776M for nonwovens in a flat, relaxed state for a minimum of four (4) hours. Each cut specimen shall be labeled, measured for its cut length and width, and recorded to nearest 1/16-inch and weighed to the nearest measure 0.1-ounce for each group of specimens sampled from left, center, and right. Each specimen weight shall be reported in ounces per square yard based upon the calculation below. The average weight for each group; left, center, right, and the total average weight shall be reported.

$$\frac{(\text{Specimen weight (oz.)} \times 1296)}{(\text{Specimen length (in.)} \times \text{width (in.)})} = \frac{\text{ounces}}{\text{square yard}}$$

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4.7.2 Batting Evenness. The target batting weight, the averaged batting weights from the left, center and right batting specimen groups, and the total averaged batting weight reported in 4.7.1 shall be utilized to evaluate batting evenness. Satisfactory batting evenness is achieved when no average batting weight exceeds the target weight by (± 5) percent according to the calculation listed below for each group of average battings reported in 4.7.1 (see 6.10)

$$\text{Percent variation from the target} = \frac{(\text{Target weight} - \text{averaged weight})}{\text{Target weight}} \times 100$$

NOTE: Evenness shall be evaluated for averaged total weight and each group of left, center and right batting groups.

4.7.3 Initial batting thickness test at 0.01 pounds per square inch (psi). The same group of cut specimens used to measure batting weight specified in 4.7.1 shall be used to measure initial batting thickness. The thickness indicator on the thickness measurement device shall be calibrated for each batting type and class for each day of testing. Thickness shall be measured using a Measure-matic thickness gage or equal (see 6.8) with a platen that can measure the entire 12-inches x 12-inches flat batting surface, gage blocks shall be utilized to calibrate the thickness indicator, and weights shall be used to apply a precise 0.01 psi pressure on the top center of the thickness platen. To calibrate the thickness gage, the unloaded platen needs to be balanced to remain suspended no more than approximately 1-inch over the batting test specimen. One (1) batting specimen from the thirty cut weight specimens shall be sampled to calibrate the thickness gage. The batting sample shall be inserted flat and smooth under the suspended unloaded platen then one hand will support the platen while the other hand places a precise 0.01 psi load, on the top center of the platen. The loaded platen shall be lowered with two hands to approximately 1/2-inch above the batting specimen without moving the batting specimen. The two (2) hands will be carefully removed so the platen descends to the batting surface gently. After the platen is in contact with the batting specimen, the platen shall rest upon the batting specimen for 10 seconds undisturbed and then the batting thickness shall be read to the nearest 0.01-inch and recorded. The calibration step requires removing the batting sample from the thickness gage, selecting a gage block to the nearest 0.1-inch of the batting thickness recorded, insert the gage block under the center of the platen and allow the platen to rest on the gage block with the 0.01 psi. If needed, adjust the thickness indicator to read the same value as the gage block under the platen. After calibrating the thickness gage, each specimen within each group of cut batting weight specimens; left, center and right, shall be placed individually under the platen and measured using the same procedure described above except the gage block portion will not be repeated. The average thickness from each group of ten (10) specimens shall be calculated and reported. Retain grouped thickness specimens for initial thermal resistance testing in 4.7.6.

NOTE: Accuracy in calculating and recording the average thickness for each group is critical to the set-up of 4.7.6 thermal resistance tests. Thickness fails if the samples do not meet the minimum initial thickness specified in Table IV.

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TABLE IV. Initial and after laundering thickness.

Types	Characteristics	
	Thickness, inches, at 0.01 psi (min.)	
	Initial	After 3 launderings
Type II		
Class 1	0.30	0.19
Class 2	0.43	0.32
Class 3	0.55	0.40
Type III		
Class 1	0.16	0.09
Class 2	0.18	0.06
Class 3	0.30	0.16
Class 4	0.51	0.19

4.7.3.1 Thickness of laundered batting at 0.01 psi. Laundered batting specimens shall be cut after completing the visual inspection of the batting durability to laundering in 4.7.5. A 12-inches x 12-inches (+0/-1/8)-inch specimen shall be sampled from each of the three (3) laundered panel where there is no batting stabilization in the center 4-inch x 4-inch area, and any stabilization in the specimen is removed from the 12-inch x 12-inch specimen, if possible. The laundered batting specimen shall be conditioned for 24 hour minimum in accordance with ASTM D1776/D1776M and tested for thickness as specified in 4.7.3. Thickness fails if the samples do not meet the minimum after laundering specified in Table IV.

4.7.4 Batting laundering and post laundering tests (all Types and Classes).

4.7.4.1 Preparation of laundry panels. A total of three (3) 24 to 26-inches x 24 to 26-inches batting square specimen shall be sampled diagonally across the batting roll width with a specimen taken from each; the left side at the beginning of the roll, the center of the batting width in the middle of the roll, and from the right side at the end of the roll, where each specimen is marked for location and machine direction. Using fabric, MIL-C-43637- Cloth, Plain Weave, Ripstop, Nylon, any class, cut six (6) specimens, each measuring 24 to 26-inches x 24 to 26-inches. Fabric specimens shall be cut diagonally across the full fabric width to sample different warp and filling yarns for the front and back covers and mark the warp direction. Construct laundry panels by placing one ply of batting between a top and bottom cover fabrics where the batting machine direction is parallel with the warp direction of each cover fabric. The panels shall be stitched with nylon or polyester thread where each edge will be over edge stitching through the three (3) plies with even tension and edges trimmed. The batting/cover fabrics shall be stabilized in the same manner used in the end item, but no less than 6-inch channel quilt (see Figure 1 - Straight pattern). The finished laundry panels must measure a minimum of 24-inches x 24-inches. The stitched laundering panels shall be conditioned in accordance with ASTM D1776/D1776M for nonwovens, in a flat, relaxed state for a minimum of four (4) hours and then marked for dimensional stability in the length and width direction in accordance with

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AATCC 135, except the length of the shrinkage marks shall be 18-inches, centered within the finished laundry panel.

4.7.4.2 Laundrying test. The marked and conditioned panels shall be laundryed three (3) times in accordance with AATCC 135 using the conditions (1-III Aiii). The dimensional marking shall be 18-inches in length and width. To prevent any residual detergent deposit, the third wash cycle shall be run without detergent. At the end of the laundrying/drying cycle, panels shall be conditioned in accordance with ASTM D1776/D1776M for nonwovens, in a flat, relaxed state for a minimum of four (4) hours. Dimensional change shall be determined in accordance with AATCC 135.

4.7.5 Batting laundryability (durability). After dimensional change is determined as specified in 4.7.4.2, the surfaces of the laundryed panels shall be visually inspected for batting fiber migration through the MIL-C-43637 cover cloth. Each surface shall be held in a flat horizontal plane at the evaluator's eye level under good lighting. The evaluator shall look across the batting surface to determine if batting fiber ends have penetrated through the cover cloth and appear above the surface of the cover cloth as single ends or as a pill where multiple fiber ends have become entangled. Any evidence of fiber migration is rated as a failure which requires a new cover cloth be selected for the end item application and or 3.5.1 batting fiber scrim be used. After the batting fiber migration has been evaluated, the panels shall be evaluated for batting durability to laundrying. The over edged side stitching shall be cut off and the center panel covers shall be removed from the front and the back to expose a minimum of 12-inch width by full length of the laundryed batting. Individually, the exposed batting area of each specimen shall be placed on a flat surface over a black background and under an overhead light to evaluate batting laundryability by visual examination and comparison to the Photographic Rating Standards for Fiberfill Durability (see 6.7). To evaluate batting laundryability, a trained observer shall stand directly in front and within 3-feet of the test specimen and visually inspect the exposed laundryed batting for fiber migration, batting separation, and fiber roping, and batting distortion from differential length and width dimensional change from the cover fabric and or scrim if used. The actual batting characteristics shall be compared to the photographic standards which are placed next to the specimen. To rate the specimen, record the photographic standard rating number that most closely matches the test specimen's exposed batting area. The highest rating "5" allows slight change in batting appearance after laundrying. Laundryed batting characteristics which appear to fall between the numerical values of the photographic standards may be rated, such as; 4.5 as appropriate. The rating value assigned for each of the three (3) specimens shall be recorded and the average rating value calculated and reported. A minimum averaged "4" rating is required for all batting Classes to achieve a "Pass" laundryability rating. If the ratings among the three (3) specimens differ by more than "1" laundryability rating, then the sample unit will be rated "Fail". If a scrim is used with the batting, an unsatisfactory laundryability rating will be recorded if the scrim is bunched, distorted, or demonstrates holes or rips.

4.7.5.1 End item cover cloth for batting (all Types and Classes). The cover cloths selected for end item evaluation shall be evaluated to verify the selected cloth prevents batting fiber ends from migrating through spaces between cloth yarns and does not demonstrate differential shrinkage that degrades batting performance by twisting, bunching or distortion that is not seen

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in the photographic standards. Laundry panel preparation, dimensional stability and launderability shall be performed as specified in 4.7.4.1, 4.7.4.2 and 4.7.5 except the cover cloths used in the end item application shall be used in place of MIL-C-43637.

4.7.6 Thermal Resistance, initially (Types II and III). Batting specimens for initial thermal resistance shall be sampled from the 12-inches x 12-inches specimens cut for batting weight where one specimen shall be random sampled from each weight group; left, center and right specified in 4.7.1. The test specimens may require trimming to lie flat on the test device and cover the entire surface within 1/8-inch of its edge. If a scrim is used, a scrim layer of the same size will be placed on the sample to be tested. Each specimen from each group shall be tested at the average thickness calculated in 4.7.3.1 at 0.01 psi for the corresponding left, center and right group from which it was sampled. Thermal resistance shall be measured in accordance with ASTM C518 using a HFM Lambda 436 or equal (see 6.9), where the top plate shall be heated to 95 (± 3)°F and the bottom plate cooled to 55 (± 3) °F. Once steady state is achieved, the thermal resistance shall be measured (deg F-hr-sqft/BTU). Thermal resistance shall be converted to clo value by multiplying (deg F-hr-sqft/BTU) times 1.138. The individual test results reported and averaged. Thermal resistance fails if the samples do not meet the minimum initial thermal resistance specified in Table V.

TABLE V. Initial and after laundering thermal resistance.

Types	Characteristics	
	Thermal Resistance, intrinsic clo,(min.)	
	Initial	After 3 laundering
Type II		
Class 1	1.40	0.90
Class 2	1.50	1.35
Class 3	1.95	1.65
Type III		
Class 1	0.70	0.50
Class 2	0.85	0.40
Class 3	1.40	0.90
Class 4	2.25	1.0

4.7.6.1 Thermal Resistance after laundering (Types II and III). One 12-inches x 12-inches specimens shall be cut from each of the laundered batting panel after batting launderability evaluation is completed per 4.7.5, for a total of three (3) specimens, where the center 4-inch x 4-inch of each specimen shall not include any original stabilization or cover fabrics. The thermal resistance of the laundered batting shall be tested and reported as specified in 4.7.6. Thermal resistance fails if the samples do not meet the minimum requirements after laundry thermal resistance specified in Table V.

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4.7.7 Toxicity test. When required, (see 6.2) an acute dermal irritation study and a skin sensitization study shall be conducted on laboratory animals. When the results of these studies indicate the batting is not a sensitizer or irritant, a Repeat Insult Patch Test shall be performed in accordance with the Modified Draize Procedure (see 2.3). If the toxicity requirement (see 3.7) can be demonstrated with historical use data, toxicity testing may not be required (see 6.2).

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of material is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Department of Defense Agency or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

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

6.1 Intended use. The batting material (quilted or unquilted) is intended for use as insulation in clothing, sleeping bags, and equipage items.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this Performance specification
- b. Type and Class required (see 1.2)
- c. The specific issue of individual documents referenced (see 2.2)
- d. When a first article is required (see 3.1.1, 4.2, and 6.3)
- e. When toxicity testing is required (see 3.7 and 4.7.7)
- f. Length of roll required (see 3.8)
- g. Conformance inspection acceptance quality limits (AQL) (4.3)
- h. Packaging (see 5.1)

6.3 First article. When a first article inspection is required (see 3.1), it will be inspected and approved under the appropriate provisions of FAR 52.209-4. The first article should be a preproduction sample. The contracting officer should specify the appropriate type of first article and the number of units to be furnished. The contracting officer should include specific instructions in acquisition documents regarding arrangements for selection, inspection, and approval of the first article.

6.4 Supersession data. This document replaces MIL-B-41826G, Batting, Synthetic Fibers, Polyester, (Unquilted and Quilted), dated 30 June 1989 and A-A-55127, Batting, Synthetic Fibers, Polyester (Unquilted and Quilted), dated 17 February 1993.

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6.5 Subject term (key word) listing.

Cold weather clothing items
Equipage
Insulation
Nonwoven
Sleeping bag

6.6 Photographic Rating Standards. The ASTM photographic standards for fiberfill durability ratings (see 4.7.5) may be obtained from the following source as “ASTM ADJD4770”:

Thomson Reuters Techstreet
36588 Treasury Center
Chicago, IL 60694-6500
Telephone: 1-800-699-9277

6.7 Measure-matic thickness gage. The following source may be used to obtain the Measure-matic (see 4.7.3): Certain Teed Machine Works, 101 Hatfield Rd., Winter Haven, FL 33880.

6.8 ASTM C518 Heat flow meter. The following source may be used to obtain the heat flow meter (see 4.7.6): Netzsch Instruments Inc., 37 North Ave., Burlington, MA.

6.9 Batting target weight and evenness example. This paragraph provides an example on how to derive batting evenness from the target batting weight and evenness requirements specified in Table I.

- Nominal batting weight for Type II class 1 is 2.2 oz./sq. yd. (± 10)% yields a weight range of 1.98 to 2.42 oz./sq. yd.
- Target weight selected for a specific end item is 2.1 oz./sq. yd.
- Batting evenness allows a (± 5)% variation of the selected target weight at 2.1 oz./sq. yd. which establishes average weight specimens for the left, center, right and total groupings must fall between 2.00 to 2.22 oz./sq. yd.

6.10 Caution. End item documents which cite batting covered by this specification should incorporate the following caution in instruction labels:

“DO NOT DRY CLEAN AND DO NOT PRESS”

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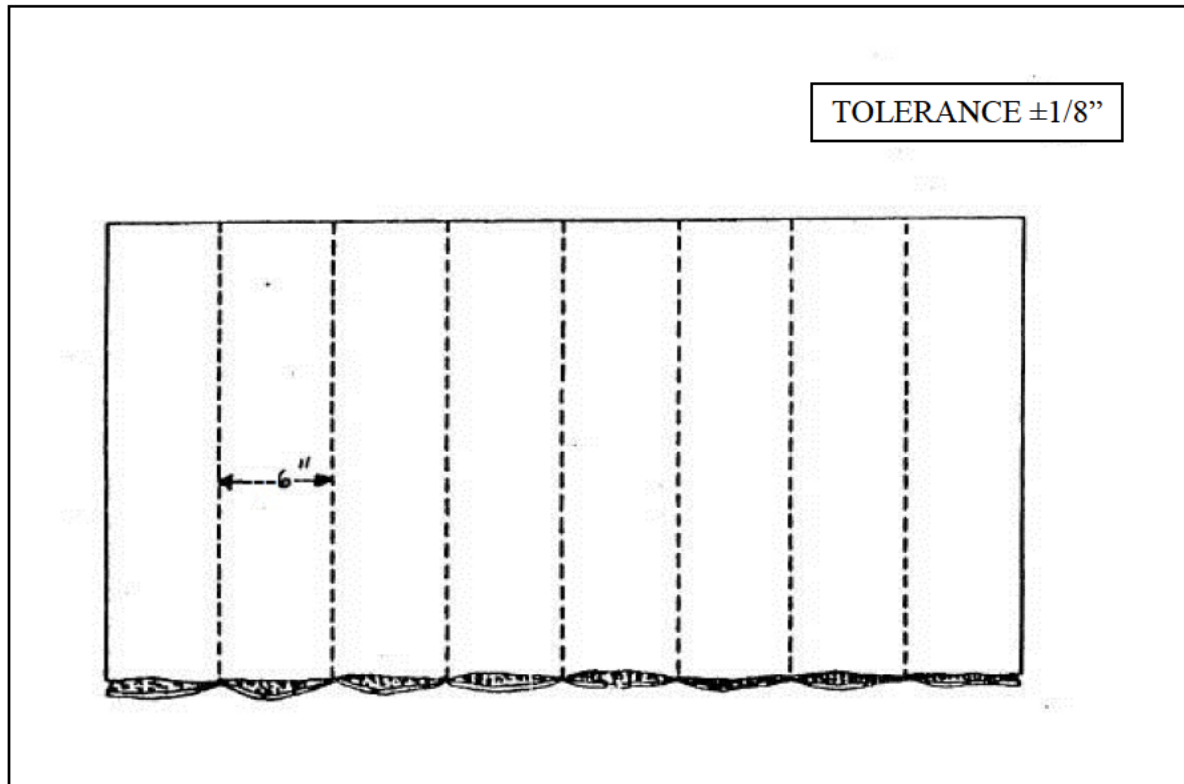


FIGURE 1. Straight pattern – 6-8 stiches per inch.

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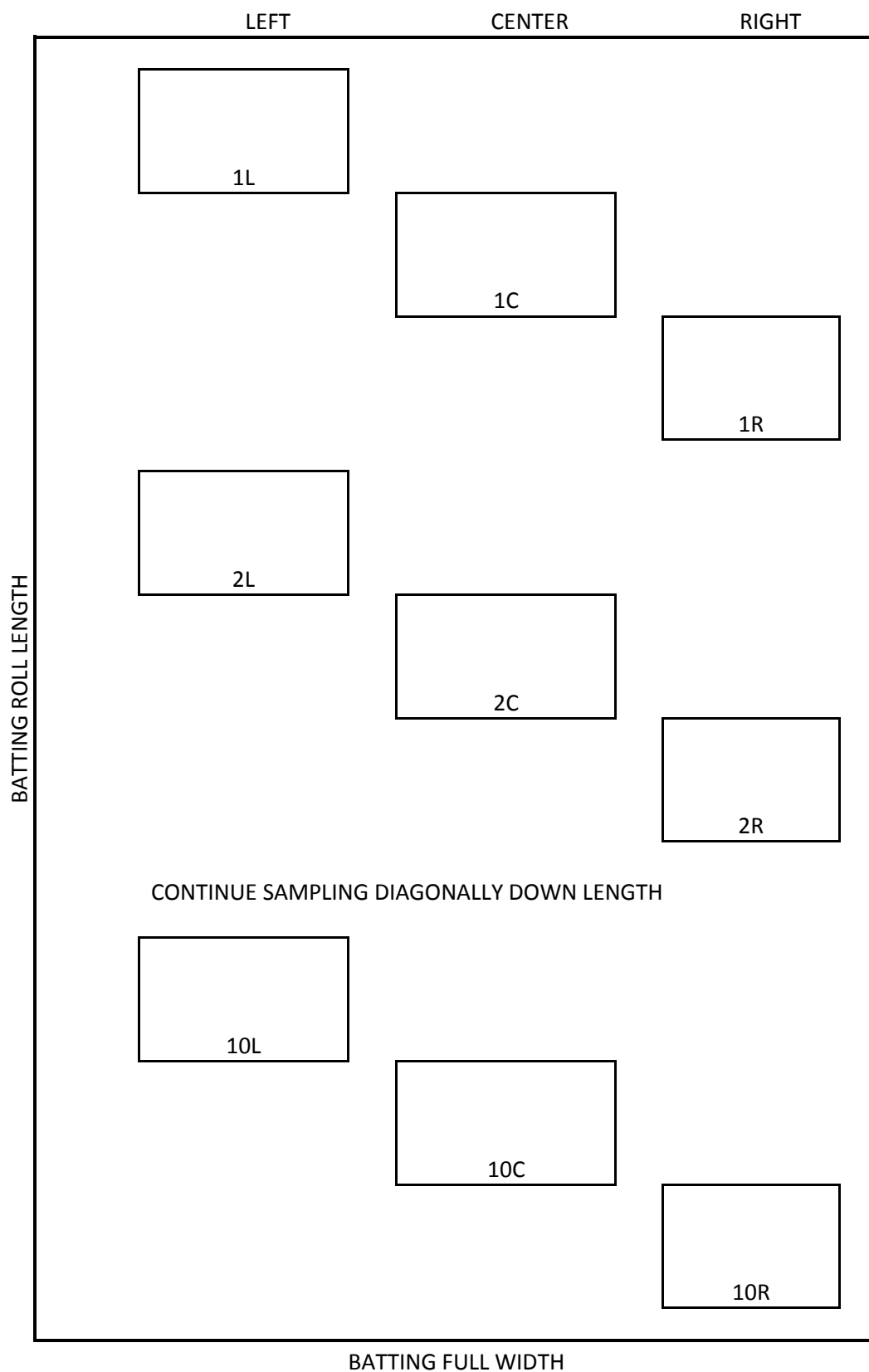


FIGURE 2. Batting weight specimen sampling pattern (see 4.7.1).

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Custodians:

Army – GL

Navy - NU

Air Force – 11

Preparing activity:

DLA - CT

Review activities:

Army - MD

Navy – MC, CG1

Project Number: 8320-2016-001

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