MIL-C-7020G
22 August 1978
SUPERSEDING
MIL-C-7020F
26 March 1969

MILITARY SPECIFICATION

CLOTH, PARACHUTE, NYLON

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

1. SCOPE

1.1 Scope. This specification covers six types of nylon cloth for use in fabrication of parachutes, quilted and coated fabrics. (see 6.1)

1.2 Classification. There shall be six types of nylon cloth of the following types and weaves, as specified (see 6.2). When drawings or specifications do not state the type or reinforced selvage, the material shall be type I.

Type I - (weight 1.1 oz/sq yd) - Rip Stop Weave

Type II - (weight 1.6 oz/sq yd) - Twill Weave

Type III - (weight 1.6 oz/sq yd) - Rip Stop Weave

Type Ia - (weight 1.1 oz/sq yd) - Rip Stop Weave, Reinforced Selvage

Type IIa - (weight 1.6 oz/sq yd) - Twill Weave, Reinforced Selvage

Type IIIa - (weight 1.6 oz/sq yd) - Rip Stop Weave, Reinforced Selvage

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 the specification to the extent specified herein.

SPECIFICATIONS

Federal

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

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: hq AFLC CASO/LODS, Federal Center, Battle Creek MI 49016 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

STANDARDS

Federal

FED-STD-191	Textile Test Methods
FED-STD-595	Colors

Military

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-109	Quality Assurance Terms and Definitions
MIL-STD-414	Sampling Procedures and Tables for Inspection by Variable for Percent Defective
MIL-STD-851	Coding; Manufacturer's Color, Nylon Parachute Cloth

(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.)

2.2 Other publications The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

Rules and Regulations Under the Textile Fiber Products Identification Act

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

3. REQUIREMENTS

* 3.1 Material. The nylon yarn used in the manufacture of all types of parachute cloth shall be a bright, high tenacity, more light and heat resistant polyamide prepared from hexamethylene and adipic acid or its derivatives. It shall have a melting point of 254° ±10° Celsius (C) (489.2° ±18° Fahrenheit (F)) when tested in accordance with 4.4. The yarn shall not be bleached in any manner or process.

* 3.1.1 Fiber identification. Each roll of cloth shall be labeled or ticketed and invoiced for fiber content in accordance with the Rules and Regulations under the Textile Fiber Products Identification Act.

* 3.2 Weave.

* 3.2.1 Type I weave. The weave pattern for type I cloth shall be as specified in Figure 1. Reinforcement ribs in both warp and the filling shall form a uniform pattern of squares. There shall be 6.5 ±.5 repeats of the pattern per inch in both directions.

* 3.2.2 Type II weave. The weave pattern for type II cloth shall be a two-up and one-down twill.

3.2.3 Type III weave. The weave pattern for type III cloth shall be as specified in Figure 2. Reinforcement ribs in both the warp and the filling directions shall form approximate squares. There shall be approximately 6 repeats of the pattern per inch in the filling direction and 5.5 repeats per inch in the warp direction.

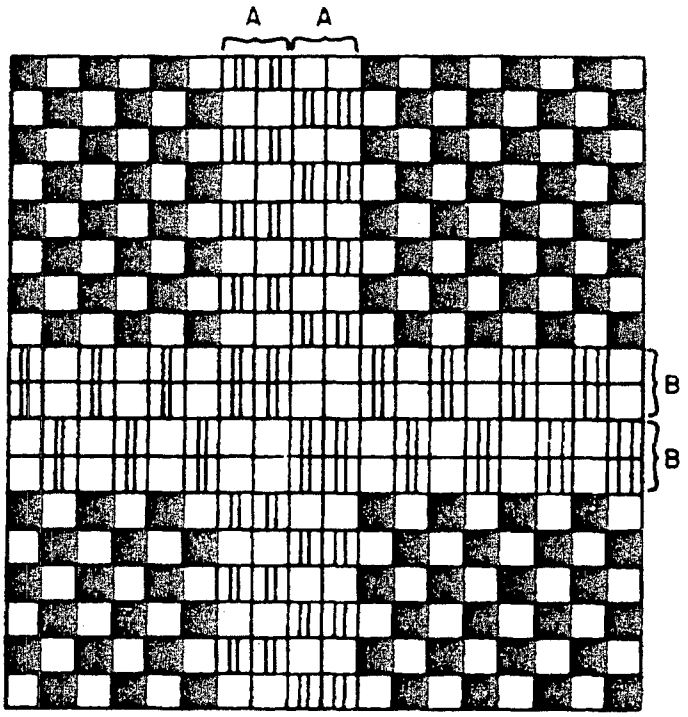
3.2.4 Types Ia, IIa and IIIa. The finish of Types Ia, IIa and IIIa fabrics shall be in accordance with 3.2.1, 3.2.2 and 3.2.3, respectively. The weave of the selvage of Types Ia, IIa and IIIa shall be at the discretion of the manufacturer to meet the requirements cited in Table I and so constructed to eliminate the fraying of the warp yarns. If the fabric is required in a width of less than 34 inches, multiple width weaving will be permitted, provided the interior as well as the selvages are straight, have no loose ends greater than 1/16 inch, are effectively locked against fraying, and meet all other requirements of the specification.

3.3 Physical and chemical properties. The physical and chemical properties of the finished cloth shall conform to Table I and subparagraphs thereto.

TABLE I - PHYSICAL PROPERTIES

Property	Type I and Ia	Type II and IIa	Type III and IIIa
Weight, ounces per square yard (maximum)	1.1	1.6	1.6
Thickness, inches (maximum)	0.003	0.004	0.004
Breaking strength, pounds per inch (minimum)			
Warp	42	50	50
Filling	42	50	50
Elongation, both directions, percent (minimum)	20	20	20
Tearing strength, pounds (minimum)			
Warp	5 ±1	5	4
Filling	5	5	4
Air permeability, CFM of air per square foot of cloth	100 ±20 1/	130 ±30	130 ±30
Yarns per inch (minimum)			
Warp	120	120	120
Filling	120	76	76
Twist, turns/inch			
Warp	5	5	5
Filling	-	-	-
Selvage Requirements	**Type Ia**	**Type IIa**	**Type IIIa**
Width, inches, ±1/16	1/2	1/2	1/2
Thickness, inches (maximum)	0.005	0.006	0.006
Breaking strength, lbs (minimum)	56	66	66

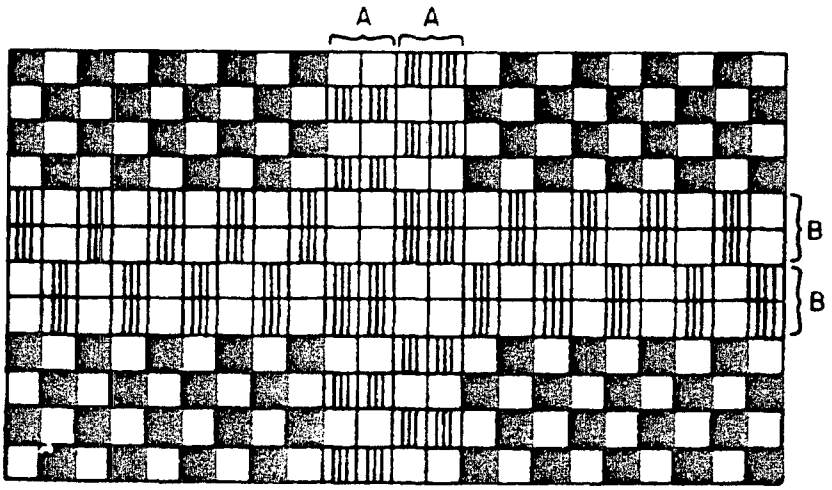
1/ For type I cloth see 6.4



A = TWO WARP ENDS WOVEN AS ONE

B = TWO FILLING PICKS PER SHED

FIGURE 1. RIP-STOP WEAVE PATTERN FOR TYPE I CLOTH.



A = TWO WARP ENDS WOVEN AS ONE

B = TWO FILLING PICKS PER SHED

FIGURE 2 RIP-STOP WEAVE PATTERN FOR TYPE III CLOTH.

3.3.1 Permanence of finish. The permanence of the cloth finish shall be such that when the cloth is subjected to the test specified in 4.4.2

a. The average of the air permeability readings taken after testing shall be within 15 percent of the average of the readings taken before testing.

b. The cloth thickness after testing shall not exceed 10 percent more than the thickness before testing.

c. The cloth shrinkage measured after testing shall not exceed 2 percent in either the warp or filling direction.

3.3.2 Stability of finish types I and Ia. The stability of the cloth finish shall be such that when the cloth is tested as specified in 4.4.3, the change in air permeability for types I and Ia cloth shall be not greater than 7.5 cubic feet of air per minute per square foot of cloth.

3.3.3 Nonfibrous materials.

3.3.3.1 Silicone oil. The finished cloth shall contain a silicone oil so applied that it is evenly distributed throughout the cloth. The amount of oil added shall be from 0.3 percent to 0.5 percent based on the weight of the dry cloth. The finisher shall submit a certification for each finisher's roll (see 4.3a) indicating that the silicone oil was used. (See 6.4)

3.3.3.2 Chloroform soluble material. The chloroform soluble material of the finished cloth shall not exceed 2.0 percent when tested as specified in 4.4.

3.3.4 Acidity - alkalinity (pH). The pH value of the finished cloth shall be within the range of 5.0 to 9.0 when tested as specified in 4.4.

* 3.3.5 Color. Unless otherwise specified, the color of the finished cloth shall be natural, international orange No. 12246, olive green No. 34092, sand No. 36306 conforming to FED-STD-595. Olive green No. 106 may be substituted for olive green No. 34092.

* 3.3.5.1 Colorfastness. When no standard is supplied, the dyed and finished cloth shall show "good" fastness with respect to light, laundering, water, and bleeding in damp air when tested as specified in 4.4

3.3.6 Light and heat resistance. The finished cloth shall not lose more than 25 percent of its original strength when tested in accordance with 4.4.5.

3.3.7 Dimensions.

3.3.7.1 Width. Unless otherwise specified, the overall width of the finished cloth shall be 36.5 ±0.5 inches (see 6.2).

* 3.3.7.2 Length and put-up. Unless otherwise specified (see 6.2), the cloth shall be in continuous lengths, each not less than 100 yards. Shorter lengths may be included in accordance with the following schedule:

75 percent - 100 yards or longer
15 percent - 25 to 100 yards
10 percent - 15 to 25 yards

The pieces from one finisher's roll shall be put in rolls as specified in PPP-P-1133.

* 3.4 Identification threads. Color threads shall be woven into the selvage edges of the cloth to identify the cloth to the procuring activity. The color used shall be those indicated in MIL-STD-851. Additional color threads may be used to identify the converter (supplier) provided that the converter has identification threads assigned by MIL-STD-851 or the procuring activity. The dye used in the marker threads shall have no deteriorative effect on the physical properties of the thread and the dyed threads shall show no bleeding or color transfer when subjected to the test as specified in 4.4.

3.5 Identification of product. Each roll of finished cloth shall be marked for identification in accordance with PPP-P-1133. In addition, each piece of cloth in each roll shall be clearly and legibly marked with the finisher's roll number or code, as specified in 4.3a, and each roll shall have attached a durable tag on which the finisher's roll number or code is listed. The date of manufacture of the cloth shall be included on the tag attached to each roll.

3.5.1 Age. The cloth shall be not more than 3-1/2 years old from the date of manufacture of the yarn to the date of delivery of cloth. (See 4.3.6.4)

3.6 Workmanship. The finished cloth shall be clean and evenly woven and shall conform to the quality and grade of product established by this specification. The finished cloth shall be free from defects except to the extent specified herein.

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.

4.2 Classification of inspection. The examination and testing of nylon parachute cloth shall be classified as quality conformance inspection.

4.3 Quality conformance inspection. The quality conformance tests and examination shall consist of the following:

a. Finisher's roll. A finisher's roll is the roll formed when lengths of cloth are seamed together for the purpose of finishing. Each finisher's roll shall be marked or tagged with a number or code for identification purposes. Each finisher's roll or every 5000 yards of fabric whichever is less, shall be tested in accordance with sampling plan A (4.3.2).

b. Shipper's rolls. Shipper's rolls are the rolls created after finishing when the finisher's roll is divided for the purpose of handling and delivery. Each shipper's roll shall be tagged with the number or code of the finisher's roll of which it was a part. Shipper's rolls shall be tested and examined in accordance with sampling plans B and C (4.3.3 and 4.3.4).

c. Pieces. Pieces are the unspliced, unseamed, etc., lengths of cloth. Each piece shall be marked with the number or code of the finisher's roll from which it was formed. Each piece shall be examined in accordance with 4.3.6.

4.3.1 Definitions. MIL-STD-109 shall apply for definitions of inspection terms used herein.

4.3.2 Sampling plan A (types I, Ia, III and IIIa only).

4.3.2.1 Lot. A lot shall consist of each finisher's roll (see 4.3a).

4.3.2.1.1 Unit of product and lot size. The unit of product shall be 1 linear yard of cloth and the lot size shall be the number of units of product in the lot.

4.3.2.2 Sampling. Each sample shall be of sufficient length and full width of the cloth to perform tests required. The number of samples required (sample size) shall be determined in accordance with inspection level III in table titled "Sample Size Code Letters" of MIL-STD-414. The distance between samples shall be determined by dividing the number of samples required into the lot size. The first sample shall be selected at the beginning of the lot and the succeeding sample selected by advancing into the lot the distance required between samples. This shall be repeated until the required number of samples have been selected. The actual distance between samples may vary from the calculated distance by ±40 percent. This latitude is permitted so that samples may be selected near an existing seam thereby reducing the number of short pieces. No sample, however, shall be selected within 28 inches of a seam. Exception to the above sampling is authorized when total lot size of material being procured is 1,000 yards or less. On these small lots, one test for air permeability will be taken on each end of every piece of cloth comprising the lot.

4.3.2.3 Test and acceptance criteria. Each sample selected in accordance with 4.3.2.2 shall be subjected to the air permeability test as specified in 4.4.1. The acceptable quality level shall be 2.5 percent. Acceptance of the lot shall be determined in accordance with the standard deviation method, double specification limit, variability unknown of MIL-STD-414. On lots less than 1,000 yards, any test failures will cause rejection of the piece of cloth represented.

4.3.3 Sampling plan B and tests.

4.3.3.1 Lot. A lot shall consist of each shipper's roll formed from one finisher's roll (see 4.3b).

* 4.3.3.2 Sampling. One sample of sufficient length, the full width of the cloth, and representative of the roll shall be selected from each shipper's roll and subjected to the following tests (see 4.4). Failure of the sample to conform to the following tests shall reject the lot represented.

a. Weight.

b. Thickness.

c. Breaking strength and elongation.

d. Tearing strength.

e. Yarns per inch.

f. Air permeability (types II and IIa only).

4.3.4 Sampling plan C and tests.

4.3.4.1 Lot. A lot shall consist of all shipper's rolls formed from one finisher's roll (see 4.3b).

4.3.4.2 Sampling. A 4-yard full width, sample shall be selected and subjected to the following tests (see 4.4). Failure of the sample to conform to the following tests shall reject the lot represented.

a. Permanence of finish.

b. Acidity-Alkalinity (pH).

c. Chloroform soluble material.

d. Colorfastness to light, dry cleaning, laundering, water.

e. Colorfastness to bleeding in damp air.

f. Stability of finish (type I).

g. Heat and light resistance (4.4.5).

h. Weave.

i. Thickness of reinforced selvage.

j. Breaking strength of reinforced selvage.

k. Weave of reinforced selvage.

* 4.3.5 Sampling plan D and testing of components. In addition to the quality assurance provisions of the subsidiary specifications, components and materials listed in Table II shall be tested for the characteristics specified and in accordance with the referenced test methods of FED-STD-191. The lot size shall be expressed in units of one cone, tube, or spool each. The unit of product shall be one cone, tube, or spool for each component. The sample size shall be in accordance with inspection level S-1 in the table title "Sample size code letters for small-sample inspection" of MIL-STD-105. The acceptance quality level for ea- characteristic shall be 6.5 test failures per 100 units.

TABLE II - COMPONENTS AND MATERIALS

Material	Characteristics	Spec Requirements	Test Method	No. Determinations per Individual Unit of Product	Results Reported
Warp and Filling Yarns	Tenacity	3.1	(')	(1)	Pass or fail
	Luster	3.1	(')	5	Pass or fail
	Melting Point	3.1	1534	2	Average of 2 determinations to nearest degree centigrade
	Bleaching	3.1	(')	(1)	Pass or fail
	Twist per Inch	Table I	(')	5	Average of 5 determinations to nearest 0.5 turns per inch
	Heat and Light Resistance	3.1	(')	1	Pass or fail
Identification Yarns	Deleterious Effect of Dye	3.4	(')	1	Pass or fail
	Colorfastness to Laundering	3.3.5.1	4614	1	Pass or fail on bleeding and color transfer

(') Acceptance with respect to this characteristic will be based on a contractor's certification of compliance.

4.3.6 Sampling plan E for examinations.

4.3.6.1 Lot. A lot shall consist of a shipper's roll from each finisher's roll (see 4.3.c).

4.3.6.2 Yard-by-yard examination. Each shipper's roll shall be visually examined yard by yard for defects as specified in 4.5.1. A shipper's roll shall contain an average of not more than 7 major defects per 100 linear yards.

4.3.6.3 Overall examination. Each shipper's roll shall be visually examined for overall defects as specified in 4.5.2. A shipper's roll shall contain no defects.

* 4.3.6.4 Inspection of manufacturing process. The contractor shall furnish a certificate of compliance indicating that the following processing requirements were satisfied:

a. Silicone oil (see 3.3.3.1).

(1) Percent added.

b. Age of cloth (see 3.5.1).

c. Bleached (see 6.5).

* 4.3.6.5 Examination for length. The examination for length shall be as specified in 3.3.7.2.

4.3.6.6 Examination and preparation for delivery. An examination shall be made as specified in 4.6.

* 4.4 Test methods. The methods of testing specified in FED-STD-191, wherever applicable, as listed in Table III, and as specified in 4.4.1 through 4.4.5 shall be followed. The physical and chemical values specified in Section 3 apply to the average of the determinations made on a unit of product for test purposes as specified in the applicable test methods.

* 4.4.1 Air permeability. The test specimen shall be 7 inches long and the full width of the cloth. The air permeability test shall consist of five individual readings made in accordance with method 5450 of FED-STD-191. The individual readings shall be equally spaced across the width (between selvages) of the test specimen except that no readings shall be taken within an area from the selvage equal to 10 percent of the specimen width. The air permeability of the test specimen shall be the arithmetic mean or average of the five individual readings (see 6.3).

* 4.4.2 Permanence of finish. Two 20-inch square specimens of the cloth shall be prepared. Using a template and indelible ink, an 18-inch square shall be marked on each specimen. The specimens shall be subjected to the air permeability and thickness tests in accordance with methods 5450 and 5030 of FED-STD-191. A container of adequate size to accommodate both specimens, prepared as described below, shall be filled to within 3 inches of the top with water which shall be heated to a rapid boil. Both specimens shall be placed in the boiling water in a "skein" form prepared by stapling the two opposite sides of a specimen together to form a loop or skein. One specimen shall have the warp yarns vertical in the skein and the other specimen shall have the filling yarns vertical. Each specimen shall then be placed over a glass rod 1/4 inch in diameter and 21 inches in length. A glass tube or rod, 1/4 inch in diameter and 21 inches in length, and approximately 45 ±5 grams in weight, shall be placed inside each loop at the bottom. Both loops shall then be suspended freely in the boiling water bath by attaching each with twine or wire to glass rods which are 1/4 inch in diameter and of sufficient length to rest on the top of the container. The specimen shall be subjected to the action of the boiling water bath for a period of 15 minutes, after which they shall be removed from the bath and allowed to drain for a few minutes. The staples shall be removed from the specimens and the specimens shall be placed flat on a horizontal screen to air dry. After the specimens are thoroughly dry they shall be exposed for at least 4 hours to a standard atmosphere of 65 ±2 percent relative humidity and a temperature of 21.1° ±1.1°C (70° ±2°F). The 18-inch

TABLE III - TEST METHODS

Test Characteristics	Requirement Paragraph	Test Method
Weave	3.2	Visual
Yarns per inch	Table I	5050
Weight	Table I	5041
Breaking strength and elongation (ravel strip) 1/	Table I	5104
Tearing strength (tongue)	Table I	5134
Thickness	Table I	5030
Chloroform soluble matter	3.3.3.2	2611
Acidity-alkalinity (pH)	3.3.4	2811
Colorfastness		
Laundering 2/	3.3.5.1	5614
Dry cleaning 2/	3.3.5.1	5620
Cold water	3.3.5.1	5630
Light 3/	3.3.5.1	5660
Bleeding in damp air	3.3.5.1	4.4.4
Resistance to light	3.3.6	4.4.5.1
Resistance to heat	3.3.6	4.4.5.2
Width	3.3.7.1	5020
Permanence of finish thickness	3.3.1b	5030 and 4.4.2
Air permeability	3.3.1a	4.4.1
Shrinkage	3.3.1c	4.4.2
Stability of finish (type I only)	3.3.2	4.4.1 and 4.4.3
Reinforced selvage thickness	Table I	5030
Breaking strength	Table I	5104 4/

1/ Except that the jaws of the clamp shall be 1 inch by 1-1/2 inches or more with the long dimension of the jaws perpendicular to the application of the load.

2/ A 2- by 2-inch square of white cloth conforming to this specification shall be used to ascertain color transfer or bleeding. Color transfer to the white cloth shall be cause for rejection.

3/ Except that the specimen shall be exposed for 20 standard fading hours.

4/ Except that only the selvage width shall be tested and the width of selvage shall be ravelled from a 3/4 inch wide strip.

square shall be measured to the nearest 0.01 inch in 6 places, 3 in the warp direction and 3 in the filling direction. The results of the warp skein and filling skein for thickness, air permeability, and shrinkage shall be averaged, and acceptance based on the average results. The percentage of shrinkage in either the warp or filling direction shall be computed as follows:

$$\frac{18 - \text{distance between marks after boiling}}{18} \times 100 = \text{percent shrinkage}$$

The specimen shall again be subjected to the air permeability and thickness test to determine conformance to 3.3.1.

* 4.4.3 Stability of finish. The specimen shall consist of a 36-inch square of cloth measured to within an accuracy of 1/2-inch. Five circles shall be marked on the specimen. The circles shall have a diameter equal to but not exceeding 2 inches more than the diameter of the cloth orifice on the test equipment. One circle shall be positioned at each of the four corners on the diagonal line connecting opposite corners and at one-third of the distance of the diagonal center of the specimen. A single air permeability reading shall be made within each circled area in accordance with method 5450 of FED-STD-191. One corner of the specimen shall be inserted through a bushing conforming to Figure 3 and the specimen pulled through the bushing and back again for 2-1/2 cycles (a total of 5 passes through the bushing). One of the corners adjacent to the first corner shall then be inserted through the bushing and the procedure repeated until the specimen has been pulled through the bushing for 5 complete cycles (a total of 10 passes through the bushing). The specimen shall be pulled straight through the bushing by pulling the specimen in the vertical direction. Care shall be taken to insure that yarns that might ravel out of the specimen do not become tangled with the bushing and restrain the specimen when being pulled through the bushing. The specimen shall again be subjected to the air permeability test. The average of the initial readings shall be compared with the average of the final readings to determine conformance to 3.3.2.

4.4.4 Colorfastness to bleeding in damp air.

* 4.4.4.1 Preparation of sample. The test sample shall be a 4-inch square consisting of 5 layers of cloth. The 2 outer layers shall be of 5.6 ounce white cotton cloth enclosing 2 layers of white rip-stop nylon with the specimen of dyed cloth being tested between the nylon. The five layers shall be sewed together along one edge.

* 4.4.4.2 Test procedures. The sample shall be immersed in distilled water for 5 minutes. The temperature of the water shall be 21.1° ±2.8°C (70° ±5°F). Remove the sample from the water and immediately roll-up without squeezing out the excess moisture. Each sample shall then be placed inside a 100 milliliter test tube, tightly stoppered, and then placed in an oven for 2 hours at a temperature of 60° ±2.8°C (140° ±5°F). The samples shall be removed from the oven and the white rip-stop nylon examined for bleeding. Evaluate the sample to determine conformance to 3.3.5.1.

* 4.4.5 Resistance to heat and light. The test specimens for determining resistance to heat and light shall be so selected that the identical warp and filling yarns are tested originally and after subjection to heat and light. This shall be done by marking all the specimens required with dye resist ink before cutting. The specimens shall be so cut and clearly marked, so that

specimens in each group, i.e., original warp and filling, warp and filling after resistance to light, and warp and filling after resistance to heat, contain identical yarns. (See Figure 4.)

* 4.4.5.1 Test procedure (resistance to light). The test specimen, see Figure 5, shall be exposed in the accelerated, weathering unit as specified in FED-STD-191, test method 5804, with the following exceptions:

a. The specimen shall be suspended on the rotating rack by attaching the corners (see Figure 5) to the rotating rack. Care must be taken to assure that the filling specimens are not shielded by the center specimen rack.

b. Corex D filters and sunshine carbons shall be used.

c. The exposure time shall be 50 hours.

d. The spray heads shall be shut off during the entire exposure period.

e. The drain pan shall contain from 1/2 inch to 1 inch of water during the entire exposure period.

f. The relative humidity shall be 55 ±5 percent and the back panel temperature shall be $68.3^{\circ} \pm 5.6^{\circ}C$ ($155^{\circ} \pm 10^{\circ}F$) during the entire exposure period.

g. The black panel shall be removed and polished every 500 hours of use. When the black surface begins to fade it shall be replaced.

h. The filter age shall range from less than 250 hours to a maximum 2,000 hours. This is to be accomplished in the following manner:

(1) Number the filter frames 1 through 8.

(2) Replace all filters with new filters

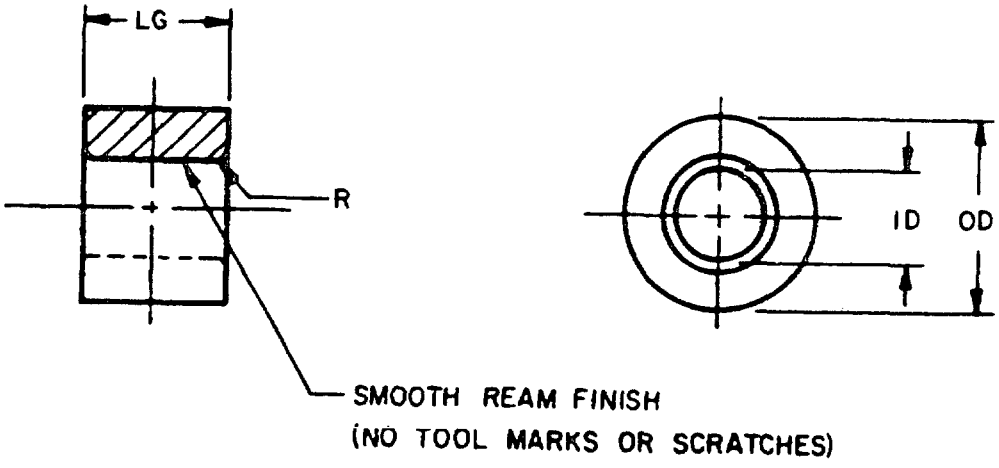
(3) Change one filter every 250 hours until all filters are changed then repeat the cycle starting with filter #1.

i. At the end of the exposure period the specimen shall be brought to equilibrium under standard conditions.

j. The specimens shall then be tested for breaking strength in accordance with FED-STD-191, test method 5104, and the percent of breaking strength loss shall be calculated as follows:

$$\frac{\text{Original average B.S.} - \text{B.S. after aging}}{\text{Original Average B.S.}} \times 100 = \text{percent of B.S. loss}$$

* 4.4.5.2 Test procedure (resistance to heat). The test specimens (see Figure 6) shall be exposed in a circulating air oven at a temperature of $180^{\circ} \pm 2.8^{\circ}C$ ($356^{\circ} \pm 5^{\circ}F$) for one hour. The velocity of the air shall be adequate to maintain a constant temperature throughout the oven chamber. The velocity will not be so great that the specimens are forced against the rack or walls of the chamber. The specimens shall be attached to the rack at two corners and suspended free with a one ounce clamp attached to each of the free corners, see Figure 6. The oven chamber shall be preheated to 180° ±2.8°C (356° ±5°F),



MATERIAL: COMMERCIAL BRASS

DIMENSIONS IN INCHES

ID = .500 ±.001
OD = 1.0 (APPROXIMATE)
LG = .750 ±.001
R = .062 (APPROXIMATE)

FIGURE 3. BUSHING

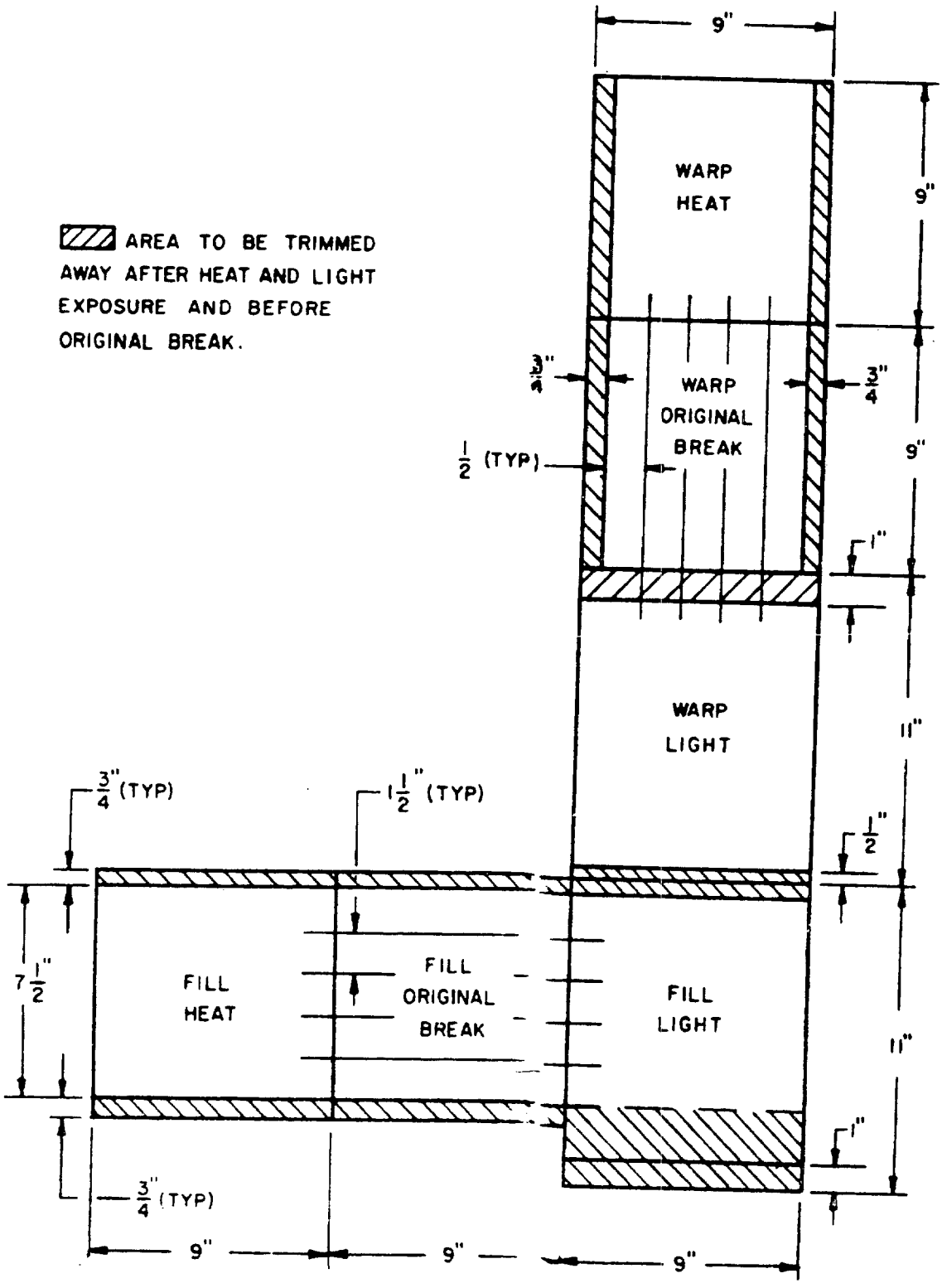


FIGURE 4. TEST SPECIMENS, ORIGINAL BREAK, HEAT AND LIGHT

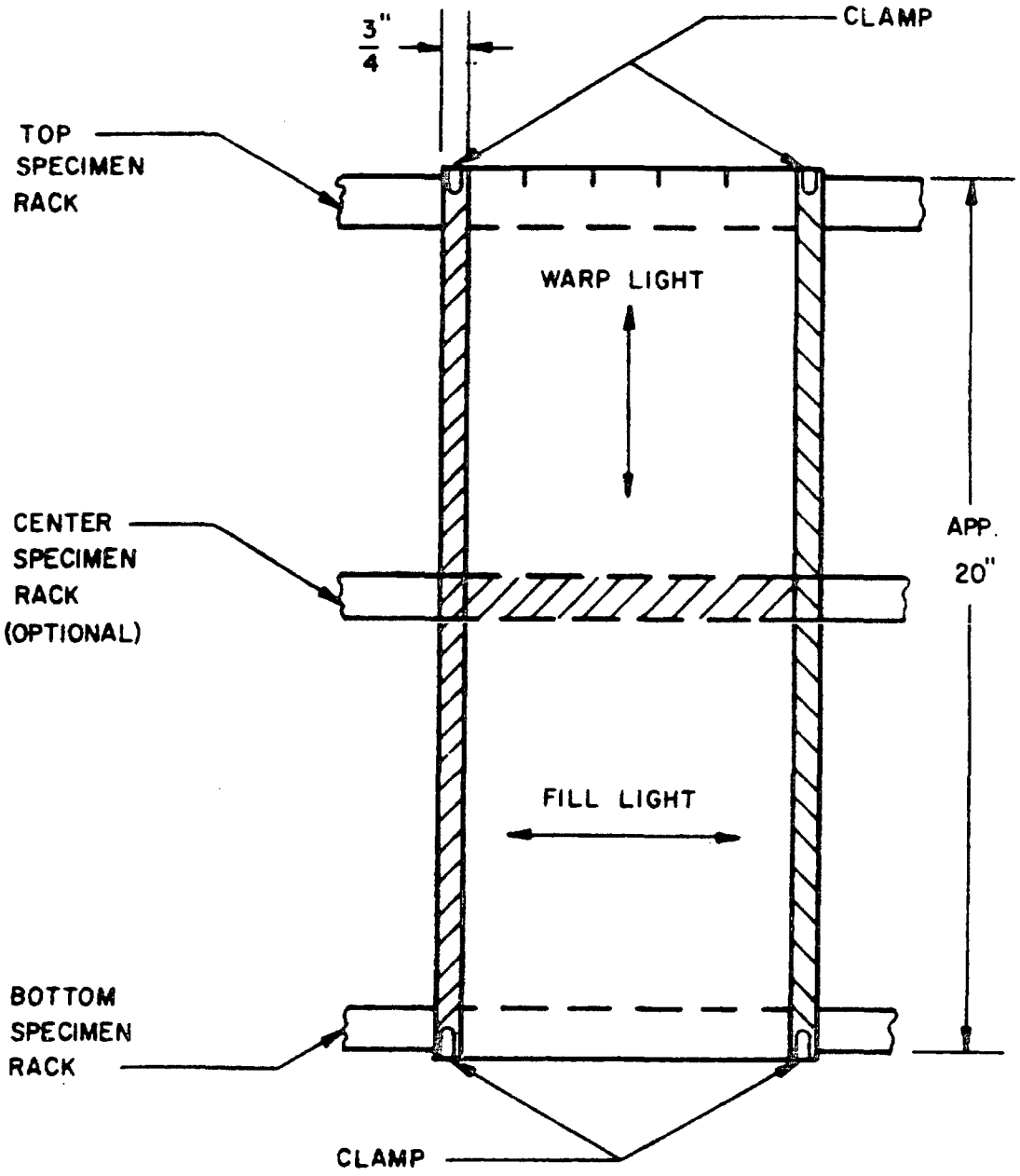


FIGURE 5. TEST SPECIMENS, RESISTANCE TO LIGHT

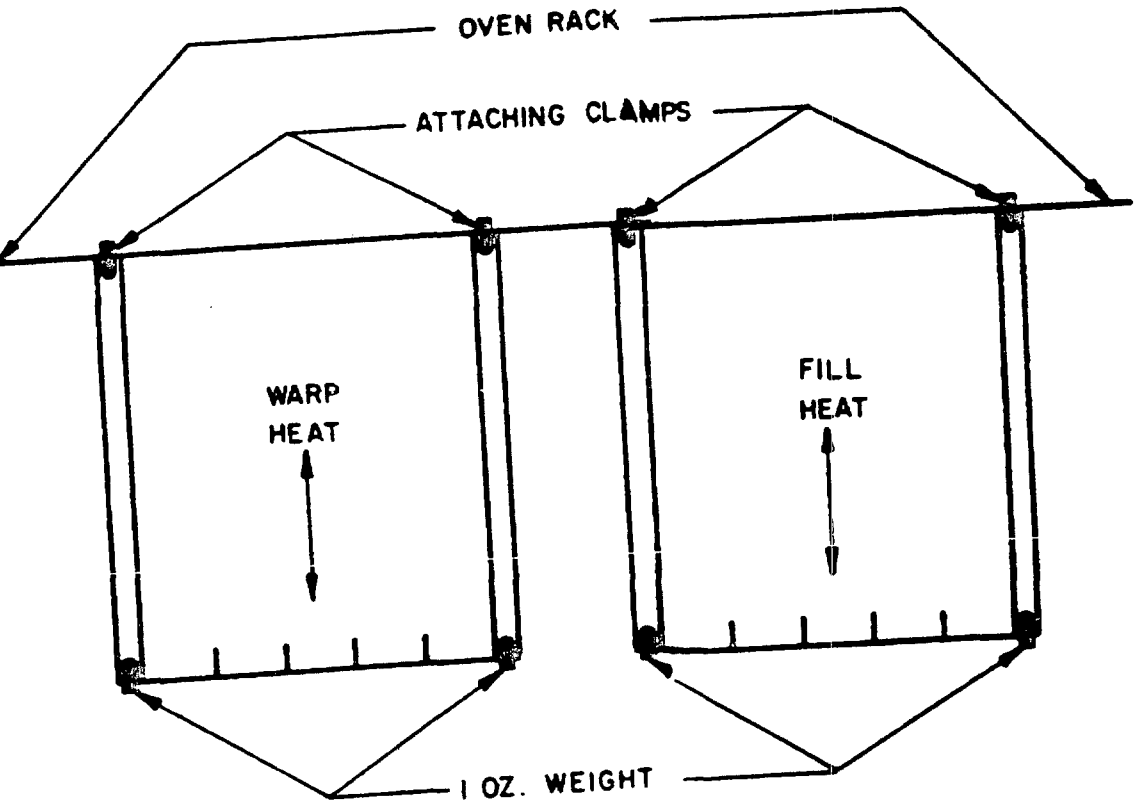


FIGURE 6. TEST SPECIMENS, RESISTANCE TO HEAT.

the rack containing the specimens shall be placed in the chamber and the one hour cycle started immediately. Note: When placing the specimens in the chamber, do so as quickly as possible to prevent loss of chamber temperature.

4.5 Examination.

* 4.5.1 Yard-by-yard examination. All cloth shall be carefully examined yard by yard and the defects classified in accordance with 4.5.1.3. The unit of product for this examination shall be one linear yard (i.e., increment of one yard on the measuring device of the inspection machine.) For each unit of product the defects shall be counted as follows:

a. One minor defect and one major defect shall be counted as one major defect.

b. Three or more minor defects shall be counted as one major defect.

c. One or more major defects shall be counted as one major defect.

d. A continuous major defect shall be counted as one defect, for each yard in which it occurs.

* 4.5.1.1 Flagging of defects. Each major defect shall be flagged by a red string sewn in the selvage. Three or more minor defects occurring in a yard shall be flagged by a red string in the selvage. A continuous major defect shall be flagged by a single yellow string sewn into the selvage for each yard containing the defect.

* 4.5.1.2 Allowance for defects. A one-half yard allowance shall be made for each major defect flagged except for continuous defects which shall be given a one yard allowance for each yard in which defect occurs.

4.5.1.3 Classification of defects. Defects found during the yard-by-yard examination shall be classified in accordance with Table IV and counted as specified in 4.5.1.

4.5.1.4 Examination for compliance with the Textile Fiber Products Identification Act. During the yard-by-yard examination each roll shall be examined for fiber identification. The lot shall be unacceptable if two or more rolls in the sample are not labeled in accordance with the Rules and Regulations Under the Textile Fiber Products Identification Act.

* 4.5.2 Overall examination. The unit of product for overall examination shall be one piece (see 4.3c). Each piece shall be carefully examined and shall contain none of the following defects:

a. Objectionable odor.

b. Uncleanliness throughout.

c. Spottiness, poor penetration of dye, or off shade to standard range.

d. Uneven weaving throughout.

TABLE IV - CLASSIFICATION OF DEFECTS

Defect	Description	Major	Minor
Abrasion	Any abrasion mark showing fuzziness	X	
Biased Filling	Biased filling more than two inches from horizontal at greatest point of bias.	X	
Bowed Filling	Bowed filling more than two inches in height (as measured from a straight line chord to highest point of arc)	X	
Missing End	Two or more contiguous: regardless of length	X	
	Single: 36 or more inches long	X	
	Single: less than 36 inches		X
Missing pick	Two or more contiguous, regardless of length	X	
	One missing pick, full width		X
Break, cut, hole or tear (other than pinhole, etc)	Three or more warp or filling threads ruptured at adjoining points	X	
Floats or skips	Any multiple float 3/16 inch square or more	X	
	Single floats 1/4 inch or more in length	X	
	Continguous pin floats, the sequence of which measures one inch or more in length		X
	Multiple floats up to 3/16 inch square		X
	Single floats up to 1/4 inch long		X
	Contiguous floats or pin floats 1/, the sequence of which measures less than one inch in length	X	
Filling bar variations	Over 1/8 inch and up to 1/2 inch in width with ten percent or less variation above normal pick count.		X
	Over 1/8 inch and up to 1/2 inch in width with more than ten percent variation below normal pick count.	X	
	Over 1/2 inch in width with more than ten percent variation from normal pick count	X	
	One-eighth inch or less in width and varying ten percent or more from normal pick count.		X
Jerked-in filling	Any jerked-in filling occurring more than four times within ten linear inches.		X

TABLE IV - CLASSIFICATION OF DEFECTS (Cont'd)

Defect	Description	Major	Minor
Loops, kinks, or snarls (except selvage)	All over 1/8 inch in length	X	
	Three or more in any linear yard up to 1/8 inch in length.	X	
	Up to two in any linear yard up to 1/8 inch in length.		X
Mispick	Three or more picks in a shed	X	
	Double or two picks		X
Yarn deformations (types I and III)	Over six yarn deformations or shifts of 1/32 inch or more over six inches in length occurring within an area equal to a six inch diameter circle.	X	
	Three to six yard deformations of 1/32 inch or more over six inches in length occurring within an area equal to a six inch diameter circle.		X
Selvage defects	Any cut, broken, torn, scalloped or clearly noted waviness along selvage edge (check for waviness under no tension)	X	
	More than three inches of continuous stringy or loopy selvage projecting 1/8 inch or more.	X	
	Continuous stringy or loopy selvage projecting up to 1/8 inch.		X
	Any clearly noticeable roll of edge or edges when tension is released (tight selvage)	X	
Smash	Any smash	X	
Weaver's stain	Any spot, stain or streak (not dye streaks) of following magnitudes:		
	a. Single ends or picks 15 inches or more in length.	X	
	b. Double ends or picks eight inches or more in length.	X	
	c. More than two ends or picks five inches or more in length or a clearly noticeable area more than 1/4 square inch in area, whichever is greater	X	
	d. Single ends or picks 2-1/2 inches up to 15 inches in length.		X

TABLE IV - CLASSIFICATION OF DEFECTS (Cont'd)

Defect	Description	Major	Minor
	e. Double ends or picks 2-1/2 inches up to eight inches in length		X
	f. Over two ends or picks less than five inches in length or a clearly noticeable area 1/4 square inch or less in area, whichever is greater.		X
Slubs, stripback, etc.	Any abruptly thickened place in the fabric caused by extraneous material woven in the fabric or a stripback continuing for more than 1-1/2 inches and being more than 1/16 inch wide for that length.	X	
	Slubs smaller than 1-1/2 inches long or 1/16 inch wide		X
Weave	Pattern other than that specified.	X	
Width	Less than the specified width.	X	
Wrong draw	Clearly noticeable warpwise streak more than 10 inches in length.	X	
Manufacturer's identification yarn	Missing yarn.	X	

NOTE: 1/ A pin float is defined as a float measuring 1/8 inch or less. Single pin floats up to 1/8 inch shall not be considered defects.

4.5.3 Examination for length.

4.5.3.1 Individual rolls. During the yard-by-yard examination, each roll shall be examined for length. Any roll length found to be less than the minimum or maximum specified or more than two yards below the length marked on the ticket or any piece less than 75 yards (see 3.3.7.2) shall be considered a defect with respect to length.

4.5.3.2 Total yardage. The lot shall be unacceptable if the total of the actual lengths of rolls examined is less than the total of the lengths marked on the ticket. (See 4.3.6.5)

4.6 Examination and preparation for delivery. An examination shall be made in accordance with the provisions of PPP-P-1133 to determine that packaging, packing and marking requirements of Section 5 of this specification are complied with. (See 4.3.6.6)

5. PACKAGING.

5.1 Packaging. Packaging shall be level A or C as specified (see 6.2).

5.1.1 Levels A and C. The cloth, put up as specified, shall be packaged in accordance with 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. 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. The primary use of this cloth is in the manufacture of parachutes. However, it may be used as a base cloth in coated fabrics for other applications.

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

a. Title, number, and date of this specification.

b. Type (see 1.2).

c. Color (see 3.3.5).

d. Quantity.

e. Width, if other than specified in 3.3.7.1.

f. Whether short lengths are acceptable (see 3.3.7.2).

g. Selection of the applicable levels of packaging and packing (see 5.1 and 5.2).

* 6.3 Air permeability, type I and type IIa cloth. In order to insure acceptance of the cloth, it is suggested that the contractor attempt to so finish the cloth that 50 percent of the individual air permeability readings are between 90 and 100 cubic feet of air per minute per square foot of cloth.

* 6.4 Silicone oil. Dow Chemical Company's silicone emulsion ET 112A has proved satisfactory for use in the finishing of this cloth.

* 6.5 Finishing. The type I and type Ia cloth shall be given a preliminary scouring sufficient to remove sizing and other contamination, at a temperature which will not cause fixation of same into the cloth or result in permanent setting of the fabric. The cloth shall be dried and calendered at sufficient temperature and pressure so as to control the air permeability in the finished cloth. The finisher may, at his discretion, omit the pre-scour and subject clean greige goods directly to the calendering operation. Further wet processing of the fabric shall be accomplished at a temperature in excess of 93°C (200°F), in order to stabilize air permeability. The length of time

required for complete setting of the cloth at this temperature shall be sufficient to shrink and set the cloth and meet the requirements set forth in 3.3.1. The above finishing procedure outlined for types I and Ia fabric is optional for finishing types II and IIa, types III and IIIa fabrics which also must meet the requirements as set forth in 3.3.1. None of the fabrics shall be bleached in any manner or process.

6.6 Chemicals. Chemicals used in processing the cloth during preparation and dyeing may accelerate fiber degradation and should be selected with care.

6.7 Reclaimed materiels. The use of reclaimed materiels shall be encouraged to the maximum extent possible.

6.8 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 inaccuracy 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.

Custodians:
Air Force - 99
Army - GL
Navy - AS

Review activities:
Army - AV
DPSC - CT

Preparing activity:
Air Force - 99

(Project 8305-0566)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
	☐ VENDOR ☐ USER ☐ MANUFACTURER ☐ OTHER *(Specify)*: _____
b. ADDRESS *(Street, City, State, ZIP Code)*	

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional	b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional	8. DATE OF SUBMISSION *(YYMMDD)*

(TO DETACH THIS FORM, CUT ALONG THIS LINE.)

DD FORM 82 MAR 1426

PREVIOUS EDITION IS OBSOLETE.