

DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS
George K. Burgess, Director

CIRCULAR OF THE BUREAU OF STANDARDS, No. 270

[Issued June 26, 1925]

UNITED STATES GOVERNMENT MASTER SPECIFICATION FOR
MERCERIZED COTTON AIRPLANE CLOTH, GRADE A

FEDERAL SPECIFICATIONS BOARD SPECIFICATION NO. 258a

[Revised June 15, 1925]

This specification was officially promulgated by the Federal Specifications Board on Dec. 6, 1924, for the use of the Departments and Independent Establishments of the Government in the purchase of mercerized cotton airplane cloth, grade A.

CONTENTS

	Page
I. Grade.....	1
II. Material.....	1
III. General requirements.....	1
IV. Detail requirements.....	2
V. Method of tests and inspection.....	3
VI. Packing and marking.....	5
VII. Additional information.....	5
VIII. General specifications.....	5

I. GRADE

The requirements given describe mercerized cotton airplane cloth, Grade A.

II. MATERIAL

The cloth shall be made of cotton with a staple length of not less than 1½ inches. It shall be thoroughly cleaned and free from waste, combed (single or double), uniform in structure, and free from avoidable manufacturing imperfections.

III. GENERAL REQUIREMENTS

The yarns shall be mercerized under tension. Selvages shall be flat and woven with no greater tension than the body of the cloth.

IV. DETAIL REQUIREMENTS

1. SIZING.—The material shall not contain over $3\frac{1}{2}$ per cent sizing.

2. NEUTRALIZATION.—The material shall be thoroughly neutralized after mercerization.

3. WEAVE.—The weave shall be plain.

4. THREAD COUNT.—The thread count shall be as specified in Table 1.

5. YARN SIZE AND PLY.—The yarn size and ply shall be as specified in Table 1. A tolerance of plus or minus four numbers will be permitted in the size of the single yarns.

6. TWIST.—It is recommended that the twist per inch be as follows: Single yarn twist, 28 to 34 turns per inch; ply twist, 16 turns per inch.

This procedure may be altered, provided the other requirements are conformed to.

7. WIDTH.—The width shall be 36 inches. A tolerance of plus or minus one-fourth inch will be permitted.

8. LENGTH OF BOLT OR ROLL.—The length of bolt or roll as used herein is defined as meaning continuous lengths averaging 60 to 65 yards or from 120 to 130 yards.

9. WEIGHT PER SQUARE YARD.—The weight per square yard shall not exceed the weight given in Table 1.

10. BREAKING STRENGTH (STRIP METHOD).—The breaking strength (strip method) shall not be less than the requirements given in Table 1.

11. ELONGATION.—The elongation shall not exceed the values given in Table 2 by more than 10 per cent.

12. REQUIREMENT TABLES.—

TABLE 1

Threads per inch				Ply		Weight per square yard	Yarn size		Breaking strength, strip method	
Warp		Filling		Warp	Filling		Warp	Filling	Warp	Filling
Minimum	Maximum	Minimum	Maximum			Warp				
80	84	80	84	2	2	Ounces 4.5	60	60	Lbs./in. 80	Lbs./in. 80

TABLE 2

Tension	Elongation	
	Warp	Filling
<i>Pounds</i>	<i>Inches</i>	<i>Inches</i>
10	0.65	0.32
20	.80	.40
70	1.20	.64

V. METHOD OF TESTS AND INSPECTION

1. **ATMOSPHERIC CONDITIONS.**—All tests for breaking strength, thread count, weight, yarn size, width, and impregnation shall be made upon material having normal moisture content, obtained by exposure for at least four hours to an atmospheric condition of 65 per cent relative humidity at 70° F.

2. **SAMPLING.**—Samples for test shall be taken from at least five bolts in each warp woven. Each sample shall be 1 yard long and the full width of the bolt; it shall be cut from the cloth at a point 10 yards from the end of the bolt.

3. **BREAKING STRENGTH (STRIP METHOD).**—Ten test specimens approximately 12 inches long by 1¼ inches wide shall be cut, five in the direction of the warp and five in the direction of the filling, respectively. Each specimen shall be raveled to exactly 1 inch by taking from each side approximately the same number of threads. Care shall be taken that no two test specimens include the same threads, except for retest as specified below. No specimen for testing shall be taken at less than 8 inches from either selvage.

The machine used shall be of the inclination-balance type. The capacity of the machine shall be 300 pounds. The lower or pulling jaw shall travel at a uniform rate of 12 inches per minute under no load. The distance between jaws shall be 8 inches at start of test. The width of the jaws shall be 1½ inches or more. Jaws shall have a smooth and flat surface with edges slightly rounded to prevent cutting. The results of the tests of each direction shall be averaged. If a specimen slips in the jaw, breaks in the jaw, breaks at the edge of the jaw, or for any reason due to faulty operation the result falls markedly below the general average, the results shall be disregarded, another specimen taken from the same threads, and the result of this break included in the average.

The elongation shall be observed when the specimens are subjected to each of the loads given in Table 2. Whenever practicable an autographic record shall be taken.

4. SIZING.—Tests for sizing shall be conducted as follows:

(a) Dry specimens weighing approximately 0.18 ounce (5 g) in tared weighing bottles at 221 to 230° F. (105 to 110° C.) to constant weight.

(b) Boil the specimens in water for 10 minutes and rinse thoroughly.

(c) Digest each specimen in a solution containing 15 cc of commercial diastofor in 500 cc of water at 140° F. (60° C.) for two hours.

(d) Wash thoroughly in hot water and then boil for one hour in 500 cc distilled water and wash again.

(e) Dry in tared weighing bottles to constant weight.

(f) Percentage sizing = $\frac{\text{loss in weight}}{\text{original weight}} \times 100$.

5. MERCERIZATION.—Take approximately one-fourth square foot of the cloth, immerse in boiling distilled water, and stir occasionally while cooling. At the end of 10 minutes place a strip of blue and a strip of red litmus paper into the liquid with the fabric and allow them to remain five minutes. At the end of this time the litmus papers must have retained their original colors. This test may be made on the yarn before weaving by substituting a small handful of the yarn for the cloth sample.

6. THREAD COUNT.—The actual number of threads in 1 inch of width shall be counted in each direction at three different places in the cloth and the results averaged for each direction. These counts shall be taken about 6 inches apart. No warp reading shall be taken at less than 8 inches from the selvage.

7. WIDTH.—The width shall be determined by laying the material on a flat surface without tension, then measuring the distance perpendicular to the length between the selvages to an accuracy of one-sixteenth inch. Three measurements shall be taken at different places in the sample and the results averaged.

8. WEIGHT PER SQUARE YARD.—*Method No. 1.*—Take a measured portion not less than 4 square inches of the material and weigh. Calculate from this area the weight per square yard.

$$\frac{1269 \times \text{weight of known area}}{\text{Area in inches}} = \text{weight per square yard}$$

Average three tests.

Method No. 2.—Cut from the sample a specimen 2 by 2 inches using a steel die. No specimen for testing shall be taken less than 8 inches from either selvage. Weigh on a balance adjusted to read the weight of the material in ounces per square yard. Average three to five tests.

VI. PACKING AND MARKING

In addition to such other marking as the purchasing office may direct, the inspector shall mark all accepted material close to the end of each bolt with the official acceptance stamp. Rejected material shall be marked with the rejection stamp and shall not be resubmitted without the express consent of the purchaser. The acceptance and rejection stamps shall be so placed that they do not injure the material, or, in the case of the rejected cloth, so that the marking does not preclude the use of the material for other than aircraft work.

VII. ADDITIONAL INFORMATION

No details specified.

VIII. GENERAL SPECIFICATIONS

No details specified.

ADDITIONAL COPIES
OF THIS PUBLICATION MAY BE PROCURED FROM
THE SUPERINTENDENT OF DOCUMENTS
GOVERNMENT PRINTING OFFICE
WASHINGTON, D. C.
AT
5 CENTS PER COPY
▽

