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BUREAU OF STANDARDS  
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UNITED STATES GOVERNMENT MASTER SPECIFICATION FOR  
INDIGO BLUE DENIM (UNSHRUNK)

FEDERAL SPECIFICATIONS BOARD SPECIFICATION No. 257a

[Revised June 15, 1925]

This specification was officially promulgated by the Federal Specifications Board on December 6, 1924, for the use of the Departments and Independent Establishments of the Government in the purchase of indigo blue denim (unshrunk).

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I. TYPES

The types of denims purchased under this specification, as may be specified in the proposal, are:

1. **WHITEBACK.**—The warp shall be blue and the filling shall be white.

2. **MOCK TWIST.**—The warp shall be blue and the filling shall be formed by combining one white roving and one black roving prior to the spinning operation.

3. **PIN STRIPE.**—The warp shall be blue with a white stripe consisting of two white yarns occurring every one-sixteenth of an inch. The filling shall be blue.

4. **HICKORY STRIPE.**—The warp shall be blue with a white stripe consisting of four white yarns occurring every one-fourth of an inch. The filling shall be blue.

5. **EXPRESS STRIPE.**—The warp shall be formed of alternate stripes of blue and white yarns one-fourth inch wide. The filling shall be white.

6. **WHITE STRIPE.**—The warp shall be blue with a white stripe consisting of two white yarns occurring every one-half inch. The filling shall be black.

## II. MATERIAL AND WORKMANSHIP

The denim shall be made of cotton thoroughly cleaned and free from dirty and oily waste. It shall be evenly woven and shall be free from an excessive number of avoidable imperfections of manufacture.

## III. GENERAL REQUIREMENTS

The colors as specified shall be identical with the standard samples obtainable on request, and if not obtainable shall be that commonly accepted as commercial practice. A 36-inch width is sometimes required instead of the standard 28-inch width. This change should be specifically stated in the proposal.

## IV. DETAIL REQUIREMENTS

1. **FINISH.**—The unshrunk denim when submitted to the shrinkage test shall not shrink more than 8 per cent in the warp direction and not more than 3 per cent in the filling direction.

2. **WEAVE.**—The weave shall be a 3-harness twill  $\left(\frac{2}{1}\right)$ , or 4-harness twill  $\left(\frac{3}{1}\right)$ , as specified in the proposal. If not specified, 3-harness twill shall be furnished. (See VII.)

3. **THREAD COUNT.**—The thread count shall be as given in the requirement table. No minus tolerance will be allowed.

4. **WIDTH.**—The average width of each roll shall be 28 inches if not otherwise specified. A tolerance of plus or minus one-fourth inch will be allowed for both 28 and 36 inch widths. (See III.)

5. **WEIGHT.**—The weight per square yard shall be as given in the requirement table. A tolerance of plus or minus  $2\frac{1}{2}$  per cent will be allowed.

6. **BREAKING STRENGTH.**—The minimum breaking strength shall conform to the amounts specified in the requirement table, as determined by the 1 by 1 by 3 inch grab method. No minus tolerance will be allowed.

7. **LENGTH OF ROLL.**—Rolls of finished cloth shall average 50 to 60 yards and for a double roll 100 to 110 yards. Lengths under 40 yards may be rejected.

8. **COLOR FASTNESS.**—All blue threads shall be dyed with indigo. The color shall show good fastness to light, washing, and water, and shall not show an excessive degree of crocking.

9. **REQUIREMENT TABLE**—

Number	Weight		Yards per pound, 28 inches wide	Minimum threads per inch		Minimum breaking strength, 1 by 1 by 3 inch grab	
	Per square yard	Per linear yard, 28 inches wide		Warp	Filling	Warp	Filling
	<i>Ounces</i>	<i>Ounces</i>				<i>Pounds</i>	<i>Pounds</i>
1.....	8.6	6.66	2.40	60	36	140	50
2.....	9.3	7.27	2.20	65	40	150	55
3.....	10.3	8.00	2.00	70	40	155	65
4.....	11.4	8.89	1.80	75	44	160	70

## V. METHOD OF INSPECTION AND TESTS

1. **SAMPLING.**—From every delivery of 200 yards or fraction thereof a sample approximately 18 inches long and the width of the cloth shall be cut for test purposes.

2. **ATMOSPHERIC CONDITIONS.**—Tests may be made under prevailing atmospheric conditions except in the settlement of disputes concerning weight and strength. Such tests shall then be made upon material having normal moisture content, obtained by exposure for at least four hours to an atmosphere of 65 per cent relative humidity at 70° F.

3. **BREAKING STRENGTH (1 by 1 by 3 inch grab).**—Six test specimens 6 inches long by 4 inches wide shall be cut, three in the direction of the warp and three in the direction of the filling, respectively. Care shall be taken that no two test specimens include the same threads, except for retest as specified below. No sample for testing should be taken at less than 8 inches from either selvage.

The machine used shall be of the inclination balance type. The maximum 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 3 inches at start of test. The inside or back half of each jaw shall be 2 inches or more in width; the other half shall be 1 inch in width. Jaws shall have a smooth and flat surface with edges slightly rounded to prevent cutting. The results of the test 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 result shall be disregarded, another specimen taken from the same threads, and the result of this break included in the average.

4. WEIGHT PER SQUARE YARD.—(a) *Method No. 1.*—Take 1 yard of the sample. Weigh, and if the width is not 1 yard calculate the weight per square yard.

$$\frac{\text{Weight of linear yard}}{\text{width}} \times 36 = \text{weight of square yard}$$

Average two tests.

(b) *Method No. 2.*—Take a measured portion of the material and weigh. Calculate from this area the weight per square yard.

$$\frac{1,296 \times \text{weight of known area}}{\text{area in inches}} = \text{weight per square yard}$$

Average three tests.

(c) *Method No. 3.*—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 torsion balance, adjusted to read the weight of the material in ounces per square yard. Average three to five tests.

5. WEIGHT PER LINEAR YARD.—The weight per linear yard shall be computed from the weight per square yard as follows:

$$\frac{\text{Weight per square yard}}{36} \times \text{width} = \text{weight per linear yard}$$

6. FASTNESS TO LIGHT.—Expose specimen to the action of an ultra-violet light for 36 hours. Compare with original sample and classify as good, fair, or poor fastness to light.

7. FASTNESS TO WASHING.—Prepare a 1 per cent neutral soap solution. Heat to about 50° C. Immerse the specimen and stir with a glass rod for several minutes. After the sample has remained in the solution 10 minutes, remove and rinse. Hang in air until dry. Compare with the original sample and classify as good, fair, or poor fastness to washing.

8. FASTNESS TO WATER.—Immerse a specimen in clear water, at room temperature (50 to 100° F.). After one hour remove and dry in the air. Compare with original sample and classify as good, fair, or poor fastness to water.

9. CROCKING.—The degree of crocking when rubbed with a piece of white cotton cloth, both when wet and dry, shall be compared with the results obtained using the standard sample if this is available.

10. SHRINKAGE.—Take a specimen approximately 12 inches square from the sample. Within this specimen with indelible ink mark off

exactly a 10-inch square with edges parallel to the warp and filling directions, respectively. Wet thoroughly in water for one hour, allow to dry in air, and measure the marked-out portion.

#### VI. PACKING

No details specified.

#### VII. ADDITIONAL INFORMATION

A 4-harness  $\left(\frac{3}{1}\right)$  twill weave may be purchased when so specified in the proposal. It must be realized that this is not a commercial weave and should only be specified when the amount is sufficiently large to warrant a special set-up of the loom. This may result in extra cost of the material.

#### VIII. GENERAL SPECIFICATIONS

No details specified.

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