U. S. Gov't
Master
Specification
No. 483

DEPARTMENT OF COMMERCE

BUREAU OF STANDARDS

George K. Burgess, Director

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UNITED STATES GOVERNMENT MASTER SPECIFICATION FOR LEATHER, RIGGING

FEDERAL SPECIFICATIONS BOARD SPECIFICATION No. 483

This specification was officially promulgated by the Federal Specifications Board on April 25, 1927, for the use of the departments and independent establishments of the Government in the purchase of rigging leather.

[The latest date on which the technical requirements of this specification shall become mandatory for all departments and independent establishments of the Government is July 25, 1927. They may be put into effect, however, at any earlier date after promulgation]

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I. GENERAL SPECIFICATIONS

There are no general specifications applicable to this specification.

II. GRADES

This specification applies to rigging leather in the form of sides in three grades: A, light; B, medium; and C, heavy.

III. MATERIAL AND WORKMANSHIP

TANNAGE.—Tannage shall be with oak bark or a combination of vegetable tanning materials.

IV. GENERAL REQUIREMENTS

1. TRIM OF SIDE.—A side shall be considered as a full half hide with the forehead trimmed off at the eye, tail not more than 2 inches long, shanks trimmed off at the knees, and snout cut off.

2. SELECTION.—The leather shall be free from holes, cuts, brand marks, deep wrinkles, and soft or spongy spots, excepting that any side may contain 10 grub holes (open or healed) and in addition either not more than two butcher cuts which do not penetrate the entire thickness of the leather, or one hole in the belly or flanks not more than 6 inches in the longest dimension, or not more than 3 surface scratches between 3 and 15 inches in length, or 10 additional healed grub holes.

3. FINISH.—The leather shall be full grain and with the flesh side free from loose flesh. The leather shall be split to the thickness specified for the grade.

V. DETAIL REQUIREMENTS

1. THICKNESS.—The thickness for the different grades shall be in accordance with the following:

Grades	Thickness (in inches)
A, light	$\frac{6}{64}$ up to $\frac{8}{64}$
B, medium	$\frac{8}{64}$ up to $\frac{10}{64}$
C, heavy	$\frac{10}{64}$ up to $\frac{12}{64}$

2. CRACKING.—The leather shall not crack open on the grain.

3. TENSILE STRENGTH.—The leather shall have a minimum tensile strength of 3,000 pounds per square inch and an average tensile strength of not less than 3,500 pounds per square inch.

4. Stretch.—The stretch shall not exceed 15 per cent at a stress of 2,500 pounds per square inch.

5. Water Absorption.—Water absorption shall not exceed 20 per cent.

6. Chemical Requirements.—The leather, on analysis, shall be in accordance with the following requirements:

Chemical constituents (moisture free basis)

	Minimum	Maximum
	Per cent	*Per cent*
Water-soluble material		15
Grease (petroleum ether extract)	6	12
Ash		1
Acid		.75
Glucose		2

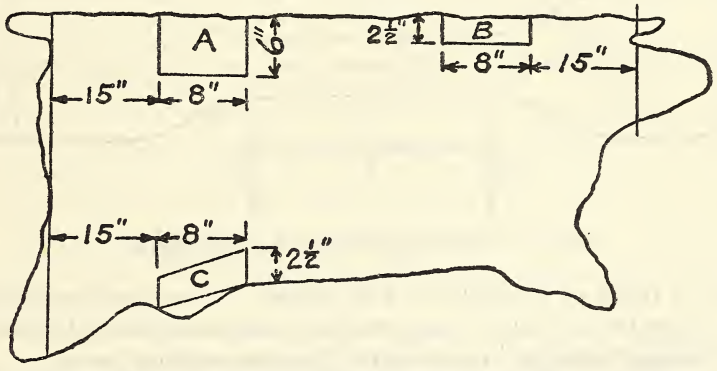

Fig. 1.—*Diagram of side showing locations and sizes of samples*

VI. METHODS OF INSPECTION AND TESTS

1. Inspection to Determine Compliance with Specification.—This inspection shall be at point of manufacture when practicable, but the right is reserved to inspect at point of delivery, in which case the material, if rejected, shall be removed by the contractor at his own expense.

2. Sampling.—Three sides shall be sampled for each lot of 200 or fraction thereof delivered. Samples shall be cut as to size and location as shown in Figure 1.

Physical-test specimens shall be cut from the samples marked A, as described hereafter. From the remaining portions of the samples marked A, and from samples B and samples C, a composite sample shall be prepared for the chemical tests.

3. Thickness.—The thickness shall be determined by measuring several points on the side, irrespective of location.

4. Cracking.—The leather shall be bent through an angle of 180° over a rod one-fourth inch in diameter, grain side out.

5. Tensile Strength.—From each sample marked A (fig. 1) three tensile-test specimens shall be cut from the portion nearest the center of the side, of the shape and size shown in Figure 2.

Parallel gauge marks 2 inches apart shall be placed on the restricted area of each test specimen. The minimum thickness between the gauge marks shall be determined for each test specimen in thousandths of an inch with any suitable gauge, which, multiplied by the width in inches, gives the area of the cross section in square inches.

The breaking strength in pounds shall then be determined on any suitable tension-testing apparatus with an accuracy of 1 pound

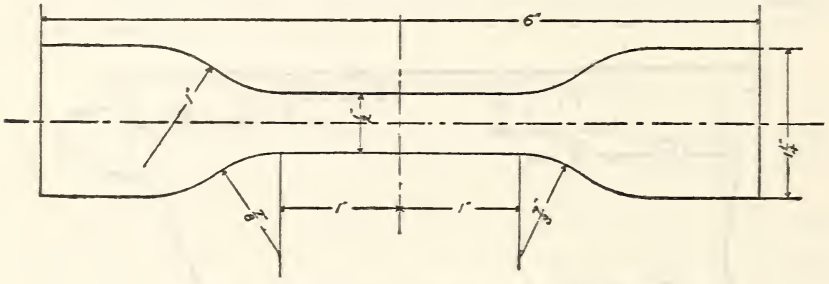

Fig. 2.—*Specimen for strength and elongation*

within a range of from 200 to 800 pounds. The tensile strength in pounds per square inch for any one test specimen is found by dividing the breaking strength in pounds by the cross sectional area.

6. Stretch.—The stretch shall be determined on the same specimens used for the tensile-strength tests. At a stress of 2,500 pounds per square inch the distance between the gauge marks shall be measured and the percentage stretch calculated. A convenient method is to measure the separation of the gauge marks with a pair of dividers and note the amount in excess of 2 inches in hundredths of an inch. This value, divided by two, will give the percentage stretch.

7. Water Absorption.—One specimen 2 by 4 inches from each sample marked "A" shall be weighed and placed in water at room temperature for 30 minutes. When removed, the surface water shall be wiped or blotted off, a new weighing made, and the percentage water absorption calculated.

8. Moisture.—Dry 10 g of leather for 16 hours at a temperature between 95 and 100° C.

9. Water-Soluble Material.—Digest 30 g of leather in a percolator overnight, then extract with distilled water at 50° C. for three hours. The total volume of the solution to be 2 liters.

Thoroughly mix solution, pipette 100 cc into a tarred dish, evaporate and dry for 16 hours at a temperature of from 98 to 100° C.

10. Grease (Petroleum Ether Extract).—Extract 5 to 10 g of air-dry leather in a Soxhlet or other suitable apparatus until free from grease, using petroleum ether boiling below 80° C. Evaporate off the ether and dry to approximately constant weight.

11. Ash.—Incinerate 5 g of leather in a muffle furnace at 600° C. Cool in desiccator and weigh. If furnace is not available, carbonize sample, add hot water and pulverize, filter through an ashless filter paper, ignite filter and residue, add filtrate, evaporate to dryness, and ignite at low heat. Cool and weigh.

12. Acid (Modified Proctor and Searle Method).—Weigh a 2 g sample. Add 25 cc of $N/10$ sodium carbonate in the case of an unloaded leather (or a larger amount, 35 cc or 50 cc in the case of a leather highly loaded with Epsom salts). After careful evaporation to dryness ignite[1] the contents of the dish until as much of the carbon is burned off as possible. Add 25 cc of hot water and digest a few moments. Filter the solution into a 300 cc flask. Wash the filter paper and unburned carbon well with hot water. Return to the dish and completely ignite. To the remaining ash add an amount of $N/10$ sulphuric acid equivalent to the amount of sodium carbonate used, digest for at least 15 minutes either on the water bath or on a hot plate. Filter into the flask containing the first filtrate and titrate the excess of acid with $N/10$ sodium carbonate, using methyl orange as the indicator.

13. Glucose.—Place 200 cc of leather extract of analytical strength in a one-half liter flask, add 25 cc of a saturated solution of normal lead acetate, shake frequently (5 to 10 minutes), and filter. (The funnels and beakers must be kept covered to prevent evaporation.) Add to the filtrate an excess of solid potassium oxalate. Mix frequently for 15 minutes and filter, returning the filtrate until clear. Pipette 150 cc of this filtrate into a 600 cc Erlenmeyer flask, add 5 cc of concentrated HCl, and boil under a reflux condenser for two hours. Cool, neutralize (place a small piece of litmus paper in the flask) with anhydrous sodium carbonate, transfer to a 200 cc graduated flask, and make to volume. Filter through a double filter. (Filtrate must be clear.) Determine the dextrose immediately in 500 cc of the solution according to the Munson and Walker method,[2] and report in percentage on leather.

[1] Since sodium carbonate is very volatile, this ignition should take place at as low a temperature as possible.

[2] This method may be found in the following references: J. A. C. S., 28, pp. 663–686; 1906; Bureau of Chemistry Bulletin 107; Methods of Analysis of the A. O. A.C., 1920 edition; and A. L. C. A. Methods of Analysis for Vegetable Tanned Leather; 1924.

VII. PACKING AND MARKING OF SHIPMENTS

1. PACKING.—Packing shall be in accordance with the best commercial practice, unless otherwise specified in the request for bids.

2. MARKING.—Each package shall be marked with the name of the contractor, name of material, and contract, order, requisition, or schedule number.

VIII. NOTE

REQUEST FOR BIDS.—The request for bids shall state the grade and the quantity desired in pounds.

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