RCB:HLS
VII-3

DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS
Washington, D.C.

Letter
Circular
LC 97.

(August 27, 1923.)

NOTES ON UPHOLSTERY LEATHER SPECIFICATIONS

INTRODUCTION

In connection with the development of specifications for the different grades of upholstery leather for government use and as a result of a request for cooperation on the same subject from the Society of Automotive Engineers certain investigations have been made relative to standards which will serve as a measure of the quality of these leathers. The procedure followed and the results obtained in this investigation are presented as a basis for the selection of satisfactory specification requirements, and also to stimulate further interest and work on a subject regarding which little data is available.

DEFINITIONS OF GRADES

Since some confusion has existed regarding the meaning of the commercial classification of grades the following is suggested as a possible standard which covers the three grades mostly used by automobile manufacturers.

Grade	Definition.
Full Grain (Snuffed)	The first split from a hide containing the full grain of the leather, the surface of which is shaved either by hand or machine removing shavings of no appreciable size or thickness.
Machine Buffed	The first split from a hide after a thin layer of the grain thickness (called a buffing and approximately 1/64 inches thick) has been removed.
No. 1 Split.	The second split or thickness of a hide secured after either a full grain or machine buffed split has been removed. Note: The No. 1 Splits under both a full grain or hand buffed split appear to be near enough equal in quality to have the same classification although in the latter the cut is begun approximately 1/64 inch deeper.

SELECTIONS.

One of the chief causes of trouble in the use of leather for upholstering is the number of defects in the hides. There has been little attempt to make a standard selection to which all tanners will adhere. Most of these defects are caused by circumstances entirely outside of the tanner's control and it would naturally be more to his interest to sell his leather on the basis of "tannery run". In the case of the consumer, where production is important and hides are cut on a piece work basis, it appears essential that the selection of leather being used at any one time be as uniform as possible. The following specifications as to selections have been suggested:

"A" Selection shall consist of leather free from brands, patches, knife cuts, knife scores and open grub holes excepting that 10% of the hides may contain not over 4 open grub holes.

"B" Selection shall consist of leather free from brands, knife cuts, knife scores. Hides may contain not over 4 patches 1 1/2 inches in the longest dimension and not over 9 open grub holes.

No attempt has been made to cover the various other selections which may contain various types of brands and other imperfections. It is believed that a large portion of the leather required can be furnished under the above and that where a consumer finds he can use lots with certain types of brands or more of the defects than allowed in the above that negotiations can be made with the contractor regarding a definition of the selection he will purchase.

SHAPES AND SIZES OF HIDES.

An important factor is the shape of the hides since they will generally cut to better advantage the nearer they are to being square in shape. The shape is governed chiefly by the type of animal from which the hide comes and to a less degree on the manner of skinning. Where hides of nearly uniform width are required the width across the brisket must be specified. With reference to area the idea at one time seemed to be to get as spready hides as possible. However, the activities of the S.A.E. have already demonstrated that smaller hides can often be cut to advantage and in fact to such an extent that the tanners will have no cause for the complaint that hides of large area are always demanded. Specifications for maximum, minimum and average area in square feet must be specified by the purchaser according to the use of the material.

THICKNESS.

The common practice among tanners is to gauge thickness by ounces. Since it is stated that an ounce is equal to 1/64 inches the following is suggested as a thickness specification that can be readily understood by all.

> The leather shall be 3/64 inches in thickness plus or minus one half of 1/64. The thickness shall be measured with a Woburn gauge or equivalent.

CRACKING OF COATING.

The cracking of the coating is an important factor in the use of upholstery leather and it is suggested that the coating should show no evidence of cracking when the leather is doubled on itself by hand, coating side out, at 32 degrees F.

FIBRE APPEARANCE

With reference to fibre appearance, a vertical section of full grain leather shall show approximately 50% of the thickness to be made up of the fine fibres and a vertical section of machine buffed leather shall show approximately 25% of the grain fibres.

PHYSICAL TEST DATA.

In order to determine the magnitude of the physical properties of upholstery leather 10 hides were submitted by automobile manufacturers for test. The hides submitted are listed below according to grade and code number.

Grade	Code Numbers.
Full Grain	A, B, C, H & I.
Machine Buffed	D, F, & J.
No. 1 Split	E & G

One half of each hide was divided into blocks approximately 12 inches by 6 inches. Each block was divided into test specimens as shown on Sheet No. L6. From each block three samples were cut out with a die for tensile tests and also the percent stretch at failure in a gauge length of two inches was noted on the same samples. The average of the three values was used as representing the value for the block. Three tear test specimens as shown on Sheet L6 were tested from each block. One specimen from each block was used for the grab tear test and the stretch at failure was also noted for this sample.

The grab test sample was 3 inches by 6 inches and was placed lengthwise in the testing machine, the clamps being three inches apart. The upper jaw of each clamp was one inch in width and the lower jaw three inches.

Beginning with block No. 1 at the tail the test specimens were cut in a lengthwise direction. Samples from alternate blocks were cut in the same direction while those from the remaining blocks were cut in the crosswise direction. The data obtained give results of the variation in physical properties for different locations on the hide both in the lengthwise and crosswise directions and for three grades of leather.

The results for the full grain leather are shown on Sheet L7 and the results for machine buffed and No. 1 Split on Sheet L8.

The average values for each hide are given in the following tables.

Tables Showing Average Values of Physical Properties for the Different Hides.

Table 1- Lengthwise Direction.

Code	1	2	3	4	5	6	7
A	48	2350	34.0	209	42	7.3	.041
B	52	2105	39.7	195	41	9.4	.050
C	59	2990	38.0	223	41	8.0	.039
H	50	2490	38.0	168	41	7.8	.041
I	39	2210	42.1	156	36	7.2	.036
D	58	2635	39.6	238	46	14.8	.044
F	60	2950	47.1	239	51	15.1	.041
J	45	2140	34.7	194	36	12.1	.042
E	51	2470	36.1	233	39	16.6	.041
G	63	2645	37.4	309	39	21.2	.047

Table 2- Crosswise Direction.

A	45	2170	43.0	163	49	7.0	.042
B	51	2010	39.0	201	41	8.3	.051
C	53	2665	38.0	212	40	7.2	.040
H	53	2460	37.0	186	36	6.7	.043
I	40	2260	39.2	160	38	7.4	.036
D	56	2615	38.0	225	42	14.6	.043
F	55	2715	53.0	226	53	16.5	.040
J	41	1900	34.7	190	37	13.3	.042
E	41	1985	39.0	204	41	19.1	.041
G	64	2740	36.0	292	39	21.5	.046

Table 5- Lengthwise and Crosswise Directions.

Code	1	2	3	4	5	6	7
A	47	2260	38.5	186	46	7.1	
B	51	2060	39.3	192	41	8.8	
C	56	2830	38.0	217	41	7.6	
H	52	2475	37.5	177	39	7.2	
I	40	2235	40.5	158	36	7.6	
D	57	2625	38.8	231	44	14.7	
F	57	2835	50.0	227	52	15.8	
J	43	2020	34.7	192	36	12.7	
E	46	2225	37.5	219	40	17.8	
G	63	2690	38.7	300	39	21.4	

Column No.

1. Breaking Strength in Pounds-Specimen 1/2 inch wide.
2. Tensile Strength in Pounds per square inch of cross-section.
3. Percentage Elongation at Breaking Point-Gauge Length 2 inches.
4. Tensile Strength in Pounds-Grab Test.
5. Percentage Elongation at Failure- Grab Test.
6. Tearing Strength in Pounds.
7. Average Thickness in Inches.

A simple test suggested for determining the strength of the various leathers is to punch a hole and insert the hook of an ordinary spring balance which is suspended in a suitable place. The sample is pulled and the pounds pull noted when tearing starts in the punched hole. A number of tests were made using this method and the results are given on sheet L9. Table 1 shows the results along the back, Tables 3 and 4 the results along the outside edge of the hide and Table 2, the results from locations about 12 inches in from the edge in the area likely to be used in service.

SUMMARY.

The results show that the greatest variation between the different grades is not in tensile strength, but in a test which involves tearing such as was made with a sample as shown on sheet L6, the grab test or the test with the spring balance. For laboratory examination it is considered that the grab test is most satisfactory with the following limitations on the results for the different grades regardless of the location on the hide.

Grade	Minimum Pounds by Grab Test.
Full Grain	100
Machine Buffed	150
No. 1 Split	200

These requirements are conservative but sufficient to show that a sample of leather has the strength necessary for the service intended and also to eliminate tender hides.

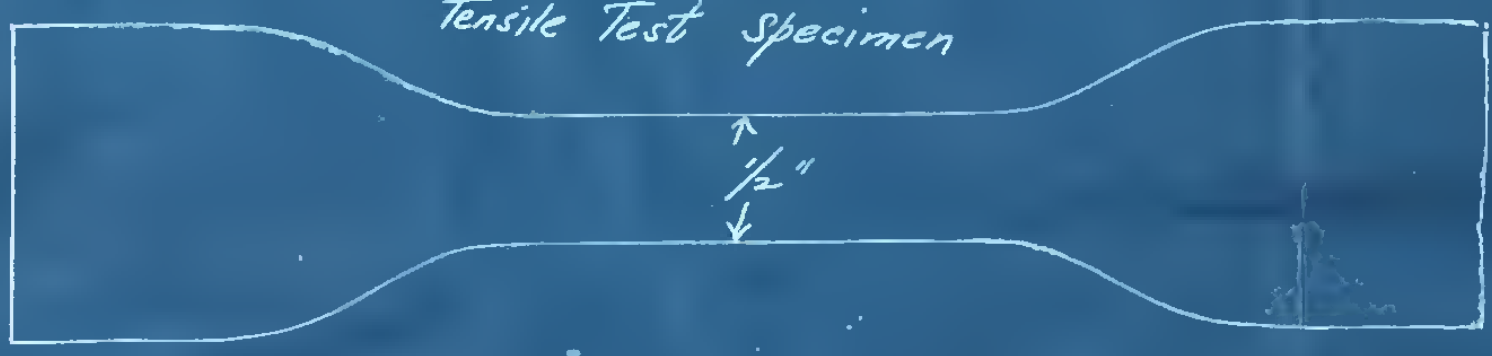
Enclosure:
4 blue prints

LOCATION OF SAMPLES IN BLOCK

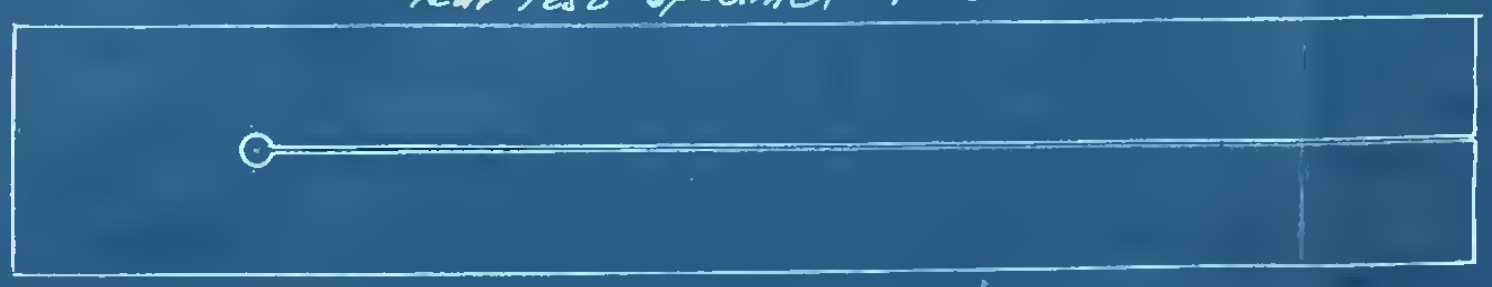
UPPER — LENGTHWISE DIRECTION — LOWER - CROSSWISE

Hide Block Sample A - 1 - 1 Tensile and Stretch				Tensile by grab test and stretch			
A - 1 - 2				A - 1 - G			
A - 1 - 3				A - 1 - T1 Tearing Test			
				A - 1 - T2			
				A - 1 - T3			
A - 2 - 1	A - 2 - 2	A - 2 - 3	A - 2 - G	A - 2 - T1	A - 2 - T2	A - 2 - T3	

Tensile Test Specimen



Tear Test Specimen 1" x 6"



DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS
LEATHER LABORATORY
TEST METHODS

DRAWN BY RCB Chk'd By RCB Scale —
Date 7/2/23 No. Sheets 4 Sheet No. 1

L 6

Back Bone Edge

Column No. — 1 - 2 - 3 - 4 - 5 - 6

Shoulder End

Butt End

1	2	3	4	5	6
30-1500-50-100-63-52 8	52-2800-29-180-30-7.0 7	42-2048-46-166-60-4.5 6	50-2477-32-190-40-5.3 5	32-1573-41-102-53-5.5 4	48-2267-29-286-33-7.8 3
238-47-10.0	50-2095-33-164-33-6.5	38-1470-46-166-50-4.8	57-2420-38-214-37-7.2	44-1650-35-204-50-7.2	67-2593-37-266-27-10.8
81-3190-38-180-35-3.2	87-4350-31-234-33-7.7	54-2613-38-190-33-5.3	57-2750-38-180-40-7.3	57-2695-39-218-47-6.5	70-3100-38-250-40-7.7
8.8	43-2323-36-130-33-3.7	50-2403-41-188-37-5.0	59-2513-39-130-30-9.7	59-2520-38-234-40-8.8	53-2387-32-116-43-7.7
C	52-3103-35-184-33-5.0 L	34-2060-31-160-30-3.2 C	47-2713-36-160-30-3.7 L	36-2097-31-128-30-4.0 C	44-2323-26-184-27-7.2 L
69-3185-33-252-39-6.8 18	41-2018-41-178-40-5.5 17	55-2582-35-218-43-6.7 16	55-2622-34-198-37-2.5 15	51-2430-34-260-47-6.3 14	38-1615-47-170-60-6.5 13
93-4310-40-350-43-10.7	60-2493-39-242-47-10.2	66-2987-38-190-37-6.2	48-1948-29-170-30-5.5	39-1480-37-228-47-7.5	44-1717-35-180-37-10.0
118-40-7.2	69-3248-36-258-40-7.2	64-3297-35-226-37-8.2	59-2990-36-250-40-8.3	59-2903-42-234-43-7.7	60-2550-41-190-43-7.7
314-37-15.0	53-2713-33-218-33-7.3	53-2643-31-180-33-10.5	63-2853-33-272-33-9.7	62-2510-42-224-34-5.5	40-1890-39-172-33-6.7
L	49-2713-40-196-37-9.7 C	54-3150-32-184-27-4.2 L	42-2523-26-168-23-5.8 C	38-2130-38-168-33-5.5 L	37-1927-44-150-30-6.3 C
28	51-2683-32-264-41-8.2 27	59-2715-38-204-40-5.5 26	49-2387-34-106-60-8.5 25	51-2220-40-150-50-6.0 24	53-2307-34-332-53-7.7 23
	57-2413-32-234-40-12.3	32-2797-33-270-33-7.5	45-1870-38-190-43-7.8	45-1672-31-170-33-8.3	66-2587-39-256-47-8.7
	68-3490-36-274-50-8.3	62-3192-34-210-33-8.3	66-3013-32-258-50-8.8	54-2510-34-190-40-7.5	75-3310-46-250-57-7.8
	46-2437-39-200-40-5.7	57-2733-35-154-33-6.5	59-2720-39-200-50-8.5	55-2447-32-152-33-8.3	58-2880-42-208-50-7.7
	56-2507-36-106-37-9.7 L	41-2283-28-198-37-7.0 C	30-1700-34-130-40-6.6 L	39-2190-41-186-43-6.8 C	38-2107-41-138-47-7.5 L
	29-2345-30-138-33-7.2 37	62-3137-34-214-37-10.2 36	44-2218-39-188-50-7.3 35	46-2123-33-256-43-5.2 34	33-1533-54-126-60-6.8 33
	250-37-10.2	53-2160-37-136-43-11.0	51-2067-36-266-43-8.5	43-1687-43-184-37-11.7	33-1375-44-142-43-11.2
	51-3153-25-166-33-7.5	49-2627-36-250-33-11.5	52-2687-36-200-37-8.0	62-3363-38-228-40-4.7	34-1670-42-180-50-9.0
	72-3617-23-232-33-6.7	38-1923-32-186-37-11.7	54-2573-36-208-43-6.7	54-2283-47-150-47-5.0	35-1683-39-190-50-6.8
	49-2710-28-182-27-6.9 C	39-2267-39-168-33-11.5 L	47-2753-37-198-33-12.3 C	41-2347-42-168-43-7.7 L	28-1787-44-136-50-6.7 C
	29-1442-39-204-53-5.7 47	53-2542-37-212-47-10.3 46	36-1940-45-270-47-12.0 45	52-2540-49-184-73-9.0 44	37-1920-26-160-33-7.7 43
	41-1726-42-230-50-9.5	65-2560-31-248-33-7.8	57-2343-33-218-60-17.0	52-2065-49-164-60-7.0	41-1918-25-178-37-9.0
	31-1647-42-130-37-10.5	63-3435-36-208-33-	41-2253-41-220-50-8.7	37-1837-62-140-60-11.2	70-2520-30-250-33-6.0
	31-1590-42-152-30-	59-3090-33-194-30-5.0	36-2130-40-246-43-13.2	56-2367-44-164-47-6.8	57-2810-30-180-47-8.2
	L	41-2793-36-174-27-8.8 C	44-2433-56-210-50-13.2 L	57-2983-48-176-53-6.0 C	34-1980-38-148-40-8.3 L
	57	55-2718-45-158-53-11.2 56	59-3060-35-228-37-13.8 55	53-2765-32-204-33-5.3 54	36-1748-68-192-53-6.7 53
		62-2397-49- 5.8	74-2835-41-320-50-16.0	66-2507-32-250-33-9.3	42-1878-62-142-60-10.5
		59-2957-38-220-57-16.7	60-3002-46-240-40-5.3	65-3943-29-250-27-7.8	36-1922-65-150-57-12.5
		56-3053-43-198-33-5.8	44-2560-44-270-50-11.8	74-3470-28-264-27-5.8	32-1640-65-130-63-7.5
		32-2180-32-164-30-12.7 C	41-2097-43-304-43-15.5 L	51-2817-39-184-33-6.5 C	43-2227-69-162-60-3.3 L
			64 39-2158-62-108-37-6.5 65		64 45-2565-34-184-47-9.3 63
			40-2093-77- -10.3		39-1227-21-166-60-
			57-2760-62-		57-2927-32-170-33-9.7
			48-2437-62-134-40-10.0	56-2240-43-182-33-7.2	61-3197-25-294-37-13.7
			28-1440-128-120-53-6.0 C L		36-2263-43-172-50-10.8 L

1	2	3	4	5	6
41-1880-26-238-42-7.5 1	50-2158-43-170-40-5.5 2	48-2267-29-286-33-7.8 3	32-1573-41-102-53-5.5 4	50-2477-32-190-40-5.3 5	42-2048-46-166-60-4.5 6
51-1902-35-184-37-7.7	68-2393-37-220-33-5.8	67-2593-37-266-27-10.8	44-1650-35-204-50-7.2	57-2420-38-214-37-7.2	38-1470-46-166-50-4.8
47-2040-32-200-33-7.3	73-3022-36-226-43-7.5	70-3100-38-250-40-7.7	57-2695-39-218-47-6.5	57-2750-38-180-40-7.3	54-2613-38-190-33-5.3
48-2250-35-180-40-5.0	64-2843-33-218-33-7.8	53-2387-32-116-43-7.7	59-2520-38-234-40-8.8	59-2513-39-130-30-9.7	50-2403-41-188-37-5.0
46-2463-23-146-30-6.2 L	46-2447-36-160-37-4.2 C	44-2323-26-184-27-7.2 L	36-2097-31-128-30-4.0 C	47-2713-36-160-30-3.7 L	34-2060-31-160-30-3.2 C
62-2212-32-216-37-8.5 11	54-2383-32-240-43-6.2 12	38-1615-47-170-60-6.5 13	51-2430-34-260-47-6.3 14	55-2622-34-198-37-2.5 15	55-2582-35-218-43-6.7 16
70-2468-26-258-30-7.5	74-2663-46-228-47-7.5	44-1717-35-180-37-10.0	39-1480-37-228-47-7.5	48-1948-29-170-30-5.5	66-2987-38-190-37-6.2
44-1825-29-214-30-6.7	73-3210-45-208-47-7.0	60-2550-41-190-43-7.7	59-2903-42-234-43-7.7	59-2990-36-250-40-8.3	64-3297-35-226-37-8.2
57-2650-30-172-27-4.2	48-2487-42-162-34-7.3	40-1890-39-172-33-6.7	62-2510-42-224-34-5.5	63-2853-33-272-33-9.7	53-2643-31-180-33-10.5
42-2140-27-192-30-8.7 C	39-2113-43-150-33-7.7 L	37-1927-44-150-30-6.3 C	38-2130-38-168-33-5.5 L	42-2523-26-168-23-5.8 C	54-3150-32-184-27-4.2 L
35-1440-44-240-60-6.8 21	47-2008-41-184-43-6.8 22	53-2307-34-332-53-7.7 23	51-2220-40-150-50-6.0 24	49-2387-34-106-60-8.5 25	59-2715-38-204-40-5.5 26
34-1257-45-126-50-5.3	53-1915-32-210-33-11.2	66-2587-39-256-47-8.7	45-1672-31-170-33-8.3	45-1870-38-190-43-7.8	32-2797-33-270-33-7.5
42-1847-45-172-63-6.0	69-3147-31-274-40-7.3	75-3310-46-250-57-7.8	54-2510-34-190-40-7.5	66-3013-32-258-50-8.8	62-3192-34-210-33-8.3
39-1590-43-154-50-6.5	63-2783-32-240-33-6.0	58-2880-42-208-50-7.7	55-2447-32-152-33-8.3	59-2720-39-200-50-8.5	57-2733-35-154-33-6.5
26-1363-46-94-47-3.0 L	41-2177-29-154-43-7.0 C	38-2107-41-138-47-7.5 L	39-2190-41-186-43-6.8 C	30-1700-34-130-40-6.6 L	41-2283-28-198-37-7.0 C
41-1957-27-188-40-6.0 31	39-1735-35-200-43-7.2 32	33-1533-54-126-60-6.8 33	46-2123-33-256-43-5.2 34	44-2218-39-188-50-7.3 35	62-3137-34-214-37-10.2 36
33-1392-29-118-40-5.0	54-1990-49-150-46-7.5	33-1375-44-142-43-11.2	43-1687-43-184-37-11.7	51-2067-36-266-43-8.5	53-2160-37-136-43-11.0
45-2330-30-120-33-4.8	56-2508-39-184-43-5.5	34-1670-42-180-50-9.0	62-3363-38-228-40-4.7	52-2687-36-200-37-8.0	49-2627-36-250-33-11.5
38-1767-32-92-33-3.7	58-2402-49-146-50-4.3	35-1683-39-190-50-6.8	54-2283-47-150-47-5.0	54-2573-36-208-43-6.7	38-1923-32-186-37-11.7
27-1607-54-86-47-3.3 C	33-1723-45-110-37-3.7 L	28-1787-44-136-50-6.7 C	41-2347-42-168-43-7.7 L	47-2753-37-198-33-12.3 C	39-2267-39-168-33-11.5 L
30-1542-29-134-30-6.8 41	39-2183-39-124-40-4.7 42	37-1920-26-160-33-7.7 43	52-2540-49-184-73-9.0 44	36-1940-45-270-47-12.0 45	53-2542-37-212-47-10.3 46
31-1338-38-108-43-7.5	44-1713-44-166-43-5.7	41-1918-25-178-37-9.0	52-2065-49-164-60-7.0	57-2343-33-218-60-17.0	65-2560-31-248-33-7.8
42-2553-38-104-40-5.7	43-2433-36-180-33-3.7	70-2520-30-250-33-6.0	37-1837-62-140-60-11.2	41-2253-41-220-50-8.7	63-3435-36-208-33-
40-2047-36-138-47-6.3	45-2433-28-180-33-4.3	57-2810-30-180-47-8.2	56-2367-44-164-47-6.8	36-2130-40-246-43-13.2	59-3090-33-194-30-5.0
29-1537-35-120-27-5.2 L	40-2287-42-142-30-4.7 C	34-1980-38-148-40-8.3 L	57-2983-48-176-53-6.0 C	44-2433-56-210-50-13.2 L	41-2793-36-174-27-8.8 C
30-1260-48-140-43-6.2 51	56-3157-22-178-30-5.7 52	36-1748-68-192-53-6.7 53	53-2765-32-204-33-5.3 54	59-3060-35-228-37-13.8 55	55-2718-45-158-53-11.2 56
37-1648-45-134-43-6.2	62-2517-30-230-33-16.2	42-1878-62-142-60-10.5	66-2507-32-250-33-9.3	74-2835-41-320-50-16.0	62-2397-49- 5.8
42-2625-29-220-30-5.3	49-3293-34-220-39-7.0	36-1922-65-150-57-12.5	65-3943-29-250-27-7.8	60-3002-46-240-40-5.3	59-2957-38-220-57-16.7
45-2115-35-214-37-6.2	52-3016-26-154-40-6.8	32-1640-65-130-63-7.5	74-3470-28-264-27-5.8	44-2560-44-270-50-11.8	56-3053-43-198-33-5.8
31-1760-35-160-37-3.3 C	45-3113-32-132-27-6.5 L	43-2227-69-162-60-3.3 C	51-2817-39-184-33-6.5 C	41-2097-43-304-43-15.5 L	32-2180-32-164-30-12.7 C
29-1710-28-150-43-4.2 61	51-2752-47-126-40-10.8 62	45-2565-34-184-47-9.3 63		64 39-2158-62-108-37-6.5 65	
36-1833-44-140-37-9.2	48-2230-44-182-67-	39-1227-21-166-60-		40-2093-77- -10.3	
44-2500-34-200-60-5.7	55-2903-37-232-40-6.3	57-2927-32-170-33-9.7		57-2760-62-	
58-2787-30-138-50-7.0	61-2360-46-150-47-16.5	61-3197-25-294-37-13.7		48-2437-62-134-40-10.0	
29-2077-43-104-27-5.8 L	C	36-2263-43-172-50-10.8 L		28-1440-128-120-53-6.0 C L	

Hide A
" B
" C
" H
" I

Belly Edge

CODE

Column No. 1 - Breaking Strength in pounds - Tensile Specimen ½ inch wide.
" " 2 - Tensile Strength in pounds per square inch of cross-section.
" " 3 - Percentage Elongation at breaking point - Gauge length 2 Ins.
" " 4 - Tensile Strength in pounds - Grab Test - Specimen 3" × 6"
" " 5 - Percent Stretch at failure - Grab Test.
" " 6 - Tearing Strength in pounds.

Number at upper right of block designates location on hide.
Letter at lower right of block designates direction samples were cut.

Physical Properties of Full Grain Upholstery Leather.
Results shown for different locations on the hide.
Tests made on five hides and values are arranged in same order for each location

DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS
LEATHER LABORATORY
UPHOLSTERY LEATHER
DRAWN BY ROB CHKD BY ROB SCALE —
DATE 6/30/23 NO. SHEETS 4 SHEET NO. 2

L7

Back Bone Edge

Column No. — 1 2 3 4 5 6

Hide D Mach Buff.
F " "
J " "
E No. 1 Split
G " " "

Shoulder End

Belly Edge

8	7	6	5	4	1
94-4340-26-288-37-10.0	53-2505-36-200-37-8.8	48-2393-32-218-37-10.0	46-2043-36-174-37-12.2	61-2537-38-230-43-11.3	53-2423-30-180-40-11.2
88-3613-32-282-43-18.6	37-1948-65-170-63-6.5	42-2497-27-126-20-6.8	28-1547-37-126-37-5.1	55-2797-29-188-33-19.2	65-3133-33-196-40-12.3
41-2269-27-190-33-10.8	31-1560-36-136-37-14.3	65-2617-30-224-33-9.5	61-2440-30-248-33-14.0	75-3177-29-198-37-7.5	37-1463-29-76-23.3.3
118-5197-33-424-37-20.8	45-2030-58-240-67-16.2	74-3250-26-346-30-15.7	57-2520-27-284-37-20.2	51-2275-27-204-30-13.5	24-1122-31-126-37-13.8
440-33-29.8	47-2180-42-278-43-13.5	71-3053-28-304-30-11.7	65-3017-26-290-30-21.2	102-3737-32-446-40-21.7	36-1493-32-154-30-17.2
C	C	L	L	C	L
18	17	16	15	14	13
98-3988-27-446-37-	82-3823-39-330-50-20.0	52-2593-31-230-33-15.2	51-2405-25-274-33-14.3	55-2377-43-240-43-13.5	49-2057-41-212-50-12.8
	57-2532-53-274-57-23.8	73-3743-36-204-33-13.0	33-1832-45-166-43-7.0	63-2770-38-298-47-21.2	72-3385-67-292-70-19.8
64-3230-20-500-43-	19-1267-37-96-33-12.0	40-2013-26-158-30-7.5	32-1467-24-138-27-7.3	40-1777-35-180-33-7.5	23-1153-42-102-43-8.5
	35-1623-57-250-20-30.2	55-2703-27-300-37-18.7	56-2688-30-272-30-16.2	59-2437-33-328-37-17.5	55-1342-37-228-43-15.2
	43-2038-52-274-50-36.2	75-3360-35-348-33-24.3	74-3507-34-298-33-14.0	35-1578-35-340-33-20.2	49-2703-34-392-30-23.7
	C	L	C	L	C
28	27	26	25	24	23
	64-2947-42-278-48-14.3	60-2998-30-288-33-23.3	50-2247-35-240-60-17.5	67-2878-37-240-47-22.5	56-2427-42-242-57-15.5
	64-2920-43-270-50-24.7	54-2750-48-210-47-12.3	45-2453-26-266-37-16.2	63-3055-49-212-67-15.5	99-4852-45-356-63-17.0
	27-1760-30-82-33-7.8	20-1033-16-126-33-6.7	35-1637-36-110-30-9.2	53-2340-34-174-37-9.2	26-1293-35-120-40-6.2
	45-2167-35-228-47-22.0	32-1530-32-214-40-17.2	42-2003-31-242-40-12.7	50-2105-30-172-33-19.3	61-2360-36-220-40-16.0
	31-1455-20-250-40-19.0	30-1502-29-184-30-16.8	29-1450-25-100-27-8.8	47-2230-30-204-33-18.5	87-3087-39-374-43-24.7
	C	C	L	C	L
	37	36	35	34	33
	57-3018-22-274-30-18.2	52-2240-33-300-40-22.5	63-2910-38-312-40-23.7	78-3303-40-200-53-15.8	67-2693-48-184-43-18.0
	198-43-19.5	55-2698-29-238-47-15.5	50-2662-49-258-57-15.7	52-2593-52-260-60-12.0	51-2722-60-188-70-21.2
	23-1490-26-174-27-15.8	30-1480-25-220-37-13.7	51-2127-38-182-30-18.5	37-1583-37-166-40-18.0	25-1187-38-174-40-22.5
	154-40-17.7	28-1347-40-178-40-15.5	21-1113-33-212-37-19.7	59-2580-38-234-37-13.6	99-1770-40-198-47-21.7
	18.7	37-1810-23-236-30-21.7	42-2130-37-208-37-20.5	43-1703-38-348-40-22.2	46-2477-39-410-50-27.8
	C	L	C	L	C
	47	46	45	44	43
		65-2937-24-242-37-16.5	55-2630-37-280-47-25.7	61-2713-25-292-43-15.0	62-2728-32-116-33-8.3
		36-1972-47-230-47-20.8	60-2700-44-180-73-19.8	52-2903-37-258-50-13.0	56-3018-84-228-67-13.5
		58-3283-34-240-37-15.0	62-2877-45-180-27-24.5	53-2378-27-250-50-21.0	80-3403-36-304-33-22.3
		58-3162-55-254-41-19.5	38-2397-60-258-60-21.0	47-2253-28-218-37-15.3	38-2008-41-152-47-22.0
		290-43-	29-1813-42-240-60-24.8	146-4283-36-560-43-27.5	98-3720-51-240-40-26.3
		L	C	L	C
		55	54	53	52
		45-2033-51-158-70-14.5	70-4142-35-270-47-20.2	37-1855-66-200-77-22.0	78-3078-27-180-30-8.7
		29-1580-71-140-63-9.5	13.2	32-1872-71-166-73-15.8	5-2645-52-228-53-132
		27-2260-33-210-47-22.5	38-2143-43-344-40-22.5	34-1587-71-198-70-28.5	124-5613-37-348-30-24.3
		37-1965-45-176-70-12.0	44-2803-54-212-47-24.7	9-577-41-78-53-18.2	87-5259-31-210-30-18.7
			46-2923-30-	59-2438-54-298-67-29.8	92-4033-40-334-40-22.2
		L	C	L	C
		65	64	63	62
			41-2200-43-234-37-8.0	71-3570-35-298-53-16.0	21-2198-53-158-50-13.7
			22-1390-76-150-33-13.5	39-2230-44-218-70-	
			25-1562-74-150-43-	41-2407-22-184-33-6.8	59-2923-33-
				28-1803-26-134-40-7.0	9-678-35-76-50-23.8
				12.5	67-2540-41-
			L	C	C

2	3	
62-2417-41-182-37-10.0	59-2382-30-234-37-10.2	
34-1607-33-108-30-12.3	117-4667-42-490-63-23.7	
43-2097-35-120-30-11.3	46-1903-28-204-33-5.3	
33-1412-33-184-40-10.5	55-2338-25-258-27-21.8	
77-2793-33-266-37-14.3	49-2163-30-250-30-18.0	
C	C	
12	11	
58-2447-42-218-47-13.8	79-2382-30-234-37-10.2	
97-4163-45-328-53-22.5	117-4667-42-490-63-23.7	
27-1210-23-134-37-8.3	46-1903-28-204-33-5.3	
74-3157-32-204-30-16.7	55-2338-25-258-27-21.8	
87-3000-40-140-30-13.0	49-2163-30-250-30-18.0	
L	C	
22	21	
83-3528-34-258-40-12.2	40-1517-49-164-40-10.3	
74-3355-52-350-47-22.8	76-3045-53-228-67-15.8	
25-1243-30-198-27-4.0	33-1377-40-126-43-8.0	
51-2137-33-348-40-21.8	43-1625-39-204-40-15.2	
97-3478-33-270-30-16.5	27-1030-36-172-40-18.3	
C	L	
32	31	
56-2317-48-220-53-11.0	55-2242-36-154-47-8.8	
67-3142-52-274-60-12.7	66-3288-43-260-50-18.0	
21-940-37-172-47-8.0	43-1843-30-198-37-10.7	
62-2859-35-250-43-15.3	54-2468-29-270-37-16.0	
102-3400-38-236-43-22.2	65-2562-24-320-27-19.2	
L	C	
42	41	
62-2728-32-116-33-8.3	30-1680-37-180-43-10.3	
56-3018-84-228-67-13.5	55-2747-51-182-60-10.5	
80-3403-36-304-33-22.3	72-2013-37-300-37-14.2	
38-2008-41-152-47-22.0	58-2740-32-214-40-19.5	
98-3720-51-240-40-26.3	94-3370-34-450-50-29.0	
C	L	
52	51	
78-3078-27-180-30-8.7	56-2627-37-204-33-11.5	
5-2645-52-228-53-132	47-2588-54-142-33-15.3	
124-5613-37-348-30-24.3	25-1287-36-70-27-4.5	
87-5259-31-210-30-18.7	20-1755-41-170-40-14.3	
92-4033-40-334-40-22.2	87-3930-44-416-40-28.3	
L	C	
62	61	
21-2198-53-158-50-13.7	39-2087-32-150-53-11.5	
	30-1885-61-142-43-10.5	
	11-660-32-44-33-2.0	
	11-700-38-58-20-8.5	
	55-2780-45-300-50-18.0	
C	L	

CODE

Column No. 1 - Breaking Strength in pounds - Tensile Specimen ½ inch wide.
" " 2 - Tensile Strength in pounds per square inch of cross-section.
" " 3 - Percentage Elongation at breaking point - Gauge length 2 ins.
" " 4 - Tensile Strength in pounds - Grab Test - Specimen 3" × 6".
" " 5 - Percent Stretch at Failure - Grab Test.
" " 6 - Tearing Strength in Pounds.

Number at upper right of block designates location on hide,
letter at lower right of block designates direction samples were cut.

Physical Properties of Machine Buffed (Hides D, F, J) and No. 1 Split (Hides E and G) Upholstery Leathers.
Values arranged in same order for each location

DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS
LEATHER LABORATORY
UPHOLSTERY LEATHER
DRAWN BY RCG CH'KD BY RCG SCALE —
DATE 7/1/23 NO. SHEETS 4 SHEET NO. 3

L 8

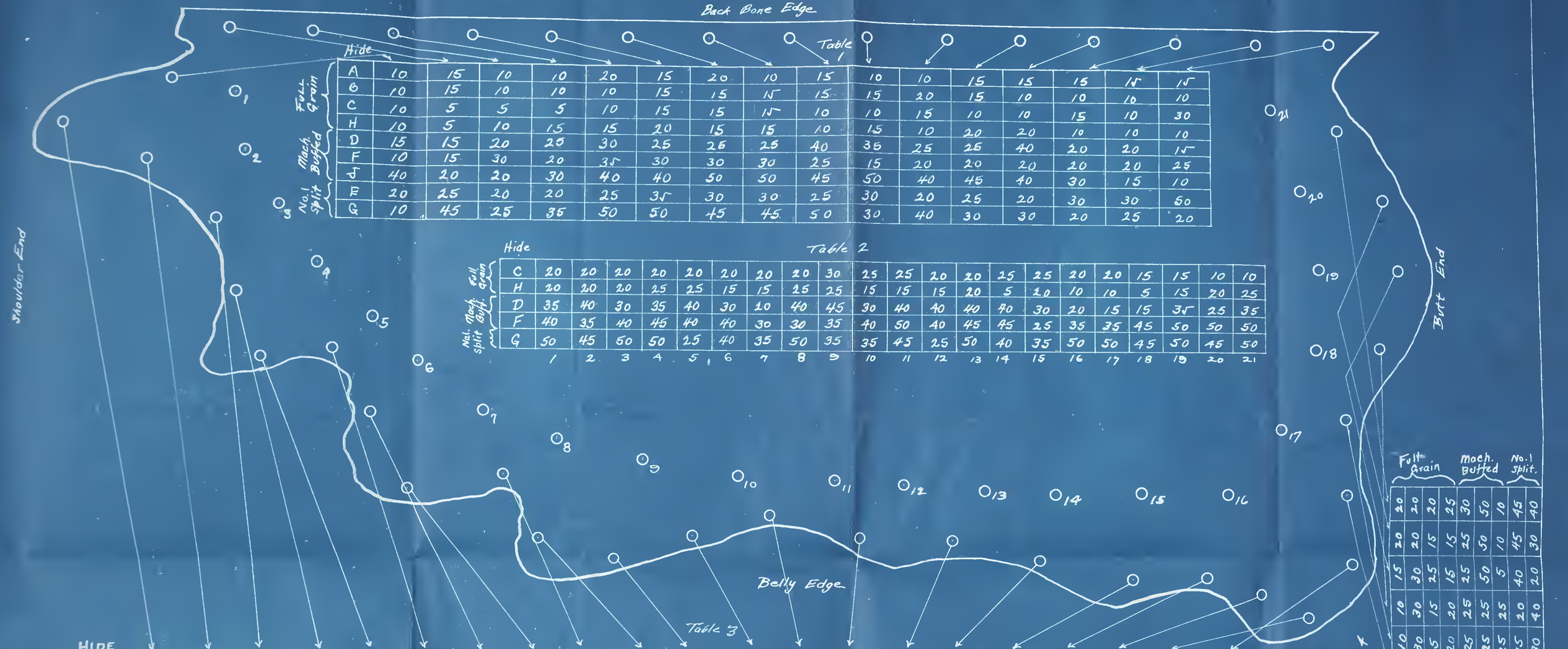


Table 1

Hide	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
A	10	15	10	10	20	15	20	10	15	10	10	15	15	15	15	15	15	15	15	15	15
B	10	15	10	10	10	15	15	15	15	15	20	15	10	10	10	10	10	10	10	10	10
C	10	5	5	5	10	15	15	15	10	10	15	10	10	15	10	30	30	30	30	30	30
H	10	5	10	15	15	20	15	15	10	15	10	20	20	10	10	10	10	10	10	10	10
D	15	15	20	25	30	25	25	25	40	35	25	25	40	20	20	15	15	15	15	15	15
F	10	15	30	20	35	30	30	30	25	15	20	20	20	20	20	25	25	25	25	25	25
J	40	20	20	30	40	40	50	50	45	50	40	45	40	30	15	10	10	10	10	10	10
E	20	25	20	20	25	35	30	30	25	30	20	25	20	30	30	60	60	60	60	60	60
G	10	45	25	35	50	50	45	45	50	30	40	30	30	20	25	20	20	20	20	20	20

Table 2

Hide	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
C	20	20	20	20	20	20	20	20	30	25	25	20	20	25	25	20	20	15	15	10	10
H	20	20	20	25	25	15	15	25	25	15	15	15	20	5	20	10	10	5	15	20	25
D	35	40	30	35	40	30	20	40	45	30	40	40	40	40	30	20	15	15	35	25	35
F	40	35	40	45	40	40	30	30	35	40	50	40	45	45	25	35	35	45	50	50	50
G	50	45	50	50	25	40	35	50	35	35	45	25	50	40	35	50	50	45	50	45	50

Table 3

Hide	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
A	15	15	15	15	15	20	5	15	15	10	15	10	15	15	20	20	5	15	15	15	5
B	20	10	20	10	40	20	10	15	20	15	10	20	15	20	15	15	20	20	15	5	5
C	10	15	20	20	20	15	5	10	10	15	25	25	25	15	20	15	25	20	20	10	15
H	30	20	15	10	10	10	10	15	20	15	10	15	10	10	10	10	10	10	15	10	5
D	25	20	25	20	15	10	10	15	15	15	20	20	20	20	16	10	10	15	15	10	25
F	25	20	25	25	25	25	10	20	20	20	10	25	35	50	40	30	25	45	30	15	10
J	45	25	25	25	25	25	15	20	35	30	25	25	15	15	10	15	5	10	10	10	25
E	40	40	40	45	45	20	10	20	10	30	15	20	25	30	10	30	20	10	5	10	15
G	35	35	40	40	40	10	25	15	50	45	10	25	30	30	40	20	20	20	20	10	15

Table 4

Hide	Full Grain			Mech. Buffed			No.1 Split.	
A	20	20	20	25	30	50	10	45	40
B	20	20	15	15	25	50	10	45	30
C	15	30	25	15	25	50	5	40	20
H	10	30	15	20	25	25	25	20	40
D	10	30	5	20	25	25	25	15	30
F	20	25	15	20	25	30	30	25	35
J	20	25	15	20	25	30	30	25	35
E	20	25	15	20	25	30	30	25	35
G	20	25	15	20	25	30	30	25	35

CHART SHOWING TEAR TEST RESULTS FOR DIFFERENT LOCATIONS ON THE HIDE
(USING ORDINARY SPRING BALANCE)

DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS
LEATHER LABORATORY
UPHOLSTERY LEATHER
DRAWN BY RCB CHKD BY RCB SCALE—
DATE 7/9/23 NO. SHEETS 4 SHEET NO. 4

L9