S. Department of Commerce
Maurice H. Stans
Secretary

National Bureau of Standards
[illegible], Director

National Bureau of Standards
Certificate of Calibration
Standard Reference Material 701c
Booklet of Faded Strips
of
Light-Sensitive Paper

P. J. Shouse and L. A. Wood

This certifies that the faded strips of light-sensitive paper, identified as NBS Standard Reference Material 700c, in this booklet have been exposed in the NBS Master Fading Lamp for a length of time which is within one-half Standard Fading Hour (SFH) of the number printed for each faded strip. The SFH was defined originally by NBS fading paper lot 1554; the calibration of this booklet was carried out by comparison with NBS fading paper lot 700b which in turn had been calibrated by previous lots of paper. This booklet is to be used only with NBS Standard Fading Paper Lot 700c.

The NBS Master Lamp is an Atlas Electric Devices SMC-R Fade-Ometer with a drum diameter of twenty inches, using No. 70 Solid Carbons and No. 20 Cored Carbons. The black panel temperature for this calibration was 150 ± 5 °F (66 ± 3 °C) and the relative humidity measured at the air exit of the lamp was 30 ± 5%. The temperature of this exit air was 120 ± 1 °F (49 ± 0.5 °C). Under these conditions and using the arc voltage and current conditions recommended by the manufacturer, twenty hours of operation of the lamp produced approximately 18 SFH of fading action.

The fading rate of this paper is sensitive to temperature and humidity, and the relationship between hours of lamp operation and the SFH produced will vary significantly with conditions other than those used here. The relationship will also be seriously affected by drum size, type of carbon, and by the type of lamp. This calibration will not be valid for lamps other than carbon-arc lamps operated at a black-panel temperature of 150 ± 5 °F (66 ± 3 °C) measured as defined in AATCC Standard Test Method 16A-1964 Appendix A1.3 and at a relative humidity of 30%.

While these papers are primarily designed for visual estimation using the procedure described in the attached NBS Miscellaneous Publication 260-15, "Recommended Method of Use of Standard Light-Sensitive Paper for Calibrating Carbon Arcs Used in Testing Textiles for Colorfastness to Light," we also give as a part of this certificate a curve and table of CIE tristimulus luminous reflectance factor Y against SFH. This luminous reflectance value Y is as measured on a properly calibrated Gardner-Type Hunter Color and Color Difference meter, but it is not a certified value. The papers may be used with instrumental measurement of reflectance, but when doing so it must be borne in mind that various instruments may give significantly different readings. Thus, when such measurements are used for test evaluation, the procedure outlined in Miscellaneous Publication 260-15 should be carefully followed.

Washington, D. C. 20234
October 1, 1971

J. Paul Cali, Chief
Office of Standard Reference Materials

(over)

Errors

A detailed analysis indicates that the standard error to be expected when a single piece of paper is exposed in the lamp is 1.3 SFH at 8 SFH and 1.8 SFH at 20 SFH when the luminous reflectance measurement error is approximately 0.0004.

The paper was prepared at the NBS pilot-scale papermill under the supervision of Donald G. Fletcher. The calibration was carried out at the National Bureau of Standards, Institute for Materials Research by P. J. Shouse and L. A. Wood of the Polymers Division.

Luminous Reflectance Factor Y
As A Function of Exposure in SFH for Light-Sensitive Paper
NBS Standard Reference Material 700c
(Y = 0.1577 for unexposed paper)

SFH	Y	Difference	SFH	Y	Difference
5.5	0.1980		16.0	0.2314	
6.0	.1998	18×10^{-4}	16.5	.2330	16×10^{-4}
6.5	.2015	17	17.0	.2343	13
7.0	.2032	17	17.5	.2356	13
7.5	.2048	16	18.0	.2371	15
		16			15
8.0	.2064		18.5	.2386	
8.5	.2081	17	19.0	.2399	13
9.0	.2096	15	19.5	.2413	14
9.5	.2112	16	20.0	.2426	13
10.0	.2129	17	20.5	.2440	14
		16			13
10.5	.2145		21.0	.2453	
11.0	.2161	16	21.5	.2466	13
11.5	.2177	16	22.0	.2479	13
12.0	.2192	15	22.5	.2492	13
12.5	.2208	16	23.0	.2504	12
		15			12
13.0	.2223		23.5	.2516	
13.5	.2239	16	24.0	.2529	13
14.0	.2254	15	24.5	.2542	13
14.5	.2269	15	25.0	.2554	12
15.0	.2284	15	25.5	.2567	13
15.5	.2299	15	26.0	.2579	12
		15			

Y is measured as R_d on a Gardner-type color difference meter, Model C-1, with green filter.