

U. S. Department of Commerce
Alexander B. Trowbridge,
Acting Secretary

National Bureau of Standards
A. V. Astin, Director

Certificate of Calibration

Standard Reference Material 701b

Booklet of Faded Strips

of

Light-Sensitive Paper

This certifies that the faded strips of light-sensitive paper, identified as NBS Standard Reference Material 700b, 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 2101 which had in turn been calibrated by previous lots of paper. This booklet is to be used only with NBS Standard Fading Paper Lot 700b.

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 $150 \pm 5^{\circ}\text{F}$ ($66 \pm 3^{\circ}\text{C}$) and the relative humidity measured at the air exit of the lamp was $30 \pm 5\%$. The temperature of this exit air was $116 \pm 1^{\circ}\text{F}$ ($47 \pm 0.5^{\circ}\text{C}$). 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, e.g. Xenon. This calibration will not be valid for lamps other than carbon-arc lamps operated at a black-panel temperature of $150 \pm 5^{\circ}\text{F}$ ($66 \pm 3^{\circ}\text{C}$) 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 on pages 3 and 4 of the attached NBS Miscellaneous Publication 260-15, "Recommended Method of Use of Standard Light-Sensitive Paper for Use in Testing Textiles for Colorfastness to Light", we also give 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, however, be used with instrumental measurement of reflectance, but when doing so it must be borne in mind that various instruments will give significantly different readings. Thus, when such measurements are used for test evaluation, the procedure outlined on pages 8, 9, and 10 of Miscellaneous Publication 260-15 should be carefully followed.

WASHINGTON, D. C. 20234
April 24, 1967

W. Wayne Meinke, Chief
Office of Standard Reference Materials

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 Paul J. Shouse and E. Passaglia of the Polymer Physics Section, E. Passaglia, Chief. This certificate was prepared by E. Passaglia.