NATIONAL BUREAU OF STANDARDS REPORT

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SPECTRAL TRANSMITTANCE OF A BLUE GLASS PHOTOMETRIC FILTER

by

Photometry and Colorimetry Section
Optics and Metrology Division

to

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NBS

U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

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ABSTRACT

The spectral transmittance of the filter was measured over the wavelength range from 400 to 750 millimicrons. The values are given in Table 1. The luminous transmittance for 2365°K derived from these values is 0.544, compared with a value of 0.543 obtained by direct measurement with the physical photometer.

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1. INTRODUCTION

These measurements were undertaken in accordance with a request initiated by Dr. Nakaji in discussions with Mr. Barbrow at the Paris meeting of the Advisory Committee on Photometry of the International Committee on Weights and Measures in 1952. Correspondence relating to this was received from Dr. Nakaji under dates of March 2 and April 25, 1953 to Mr. Barbrow, with a second letter dated April 25 from Dr. Nakaji to Dr. Gibson. Mr. Barbrow's reply to Dr. Nakaji was made under date of March 11, 1953. The glass was received from the Japanese Embassy in Washington in May, 1953.

In accordance with a letter from Dr. Nakaji to Mr. Barbrow dated November 24, 1953, Mr. I. Honjoh visited the National Bureau of Standards on January 5, 1954 and conferred with Messrs. Barbrow and Gibson. The blue glass was returned to Mr. Honjoh at that time, together with a table of the spectral transmittance values as reported herein.

2. MATERIAL

The glass measured is of the type designated as cobalt blue. It is similar to the glasses measured by the Bureau during 1928-32 in cooperation with the national laboratories of Britain, France, and Germany (Glasses R1-28, R2-28, R3-28, R4-28, Annexe No. 40, page 307, Proces-Verbaux des Seances, volume 16, Annexes du Comite Consultatif d'Electricite et de Photometrie, 1933), which served to extend the unit of luminous intensity from the freezing point of platinum to higher color temperatures.

The present glass is approximately 2 inches square and 1.49 mm thick and bears the designation "DSII" on a small triangle of paper glued to the glass. The glass is slightly non-uniform in thickness.

3. SPECTROPHOTOMETRIC MEASUREMENTS

Measurements were made on three of the NBS spectrophotometers: (1) General Electric recording spectrophotometer with slit widths approximating 4 mμ of spectrum, (2) General Electric recording spectrophotometer with slit widths approximating 10 mμ of spectrum, and (3) Beckman quartz (DU) spectrophotometer with slit widths of 1 to 2 mμ of spectrum. In all cases the temperature of the glass was kept close to 25°C.

4. SPECTRAL TRANSMITTANCE

Examination of the data from the three instruments indicated that there were slight errors at certain wavelengths in the values obtained with the General Electric spectrophotometer having the wide (10 mμ) slits. It was accordingly decided to take the averages of values obtained with the other two instruments (General Electric, 4 mμ slits, and Beckman, 1 to 2 mμ slits) for use in this report. These values are given in Table 1 attached. However, at any wavelength, the average of the data from the three instruments does not differ from the respective value given in Table 1 by more than 0.003; at most wavelengths the difference is less than 0.001.

The values of Table 1 are uncertain in the third decimal.

5. LUMINOUS TRANSMITTANCE

The value of luminous transmittance for a source at 2365°K (c_2 = 14380 micron degrees) derived from the values of Table 1 by the usual summation procedure is 0.544.

Direct measurement of this quantity on the NBS physical photometer gave a value of 0.543.

Table 1

Spectral Transmittance of Cobalt Blue Glass

Submitted by Dr. Y. Nakaji, Associate Director
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Wavelength in mμ	Transmittance
400	0.917
410	.914
420	.909
430	.902
440	.893
450	.882
460	.865
470	.835
480	.793
490	.745
500	.703
510	.652
520	.606
530	.571
540	.574
550	.615
560	.636
570	.594
580	.513
590	.451
600	.454
610	.470
620	.479
630	.474
640	.466
650	.473
660	.506
670	.569
680	.665
690	.764
700	.840
710	.883
720	.903
730	.912
740	.917
750	.919