DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS
WASHINGTON

ADDRESS REPLY TO
BUREAU OF STANDARDS

IN YOUR REPLY
REFER TO FILE NO.

GKB:DEK

D

Subject: Letter Circular 235, and first and second revisions.
The ultraviolet spectral transmission of various new glasses and window glass substitutes, used in therapy.

The original and revisions including the second revision of September 29th, 1927, are withdrawn from circulation pending the analysis of new and important information on this subject.

There has apparently been confusion in interpretation of certain statements with regard to the comparative values of these new glasses for use in windows subject to incident sunlight and the interpretation of laboratory measurements on such glasses.

The Bureau therefore desires the opportunity for further study of the matter, including sunlight tests.

Respectfully,

George K. Burgess

George K. Burgess, Director.

LC-235
Revised
9-14-27.

WWC:AEH
IV-5

DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS
WASHINGTON

Letter
Circular
LC 235
(revised)

September 14, 1927.

THE ULTRAVIOLET SPECTRAL TRANSMISSION OF VARIOUS NEW GLASSES AND WINDOW GLASS SUBSTITUTES, USED IN THERAPY*

1. This letter circular is issued in response to numerous inquiries for information on the transmissive properties of new glass and organic substitutes for window glass for use in solariums, sun parlors, animal houses, etc.

2. The data presented in paragraph 4 refer to the extreme ultraviolet region of the solar spectrum, which rays of wavelengths less than 3100A are almost completely absorbed by common window glass and which are found to have a therapeutic value in preventing rickets, etc.

The data presented in paragraph 5 refer to the long wavelength (3100 to 4000A) ultraviolet solar rays largely transmitted by common window glass, which information is sometimes requested in connection with the general problem of light stimulation. It is not the function of this Bureau to pass judgment on these claims and reference is made to recent biological tests of substitutes for window glass described in the Journal of the American Medical Association, Vol. 88, p. 1562; May 14, 1927.

3. Biologically, it is found that ordinary window glass completely absorbs the short wavelength (less than about 3100 A.U.) ultraviolet rays of the sun which have a therapeutic value in preventing rickets, etc. Recently new glasses, and organic substitutes for window glass, have been developed which transmit some of these therapeutic rays.

Using a common window glass as a filter, having a transmission = 0 per cent for wavelengths less than 3100A, radiometric measurements were made at sea level, during the noon hours in April, May, and June, 1927, to determine the magnitude of this short wavelength ultraviolet radiation in terms of the total incoming solar radiation. This gives at the noon hour about 3.5 to 4 per cent of the total (which varies from 1.25 to 1.3 gr. cal. per cm^2 per min.) or 0.04 to 0.05 gr. cal. per cm^2 per min. The value is fairly constant for 3 to 4 hours, during midday, but decreases to an imperceptible value at sunrise and sunset. It fluctuates greatly with weather conditions and the season, falling relatively low in the winter and rising to its maximum value when the solar altitude is highest.

* Prepared by W. W. Coblentz.

4. ULTRAVIOLET ABSORBED BY WINDOW GLASS -- By direct radiometric measurements made during the noon hours in April to June, 1927, the total amount of these short wavelength ultraviolet solar rays of wavelengths less than 3100A transmitted by these materials, when new, was found to be approximately:

Quartzglass and Corex	92 per cent
Vitaglass	50 "
Celoglass	20 "
Quartz-Lite	5 "
Flexoglass	1 "
Window glass	0 to 5 per cent

5. ULTRAVIOLET TRANSMITTED BY WINDOW GLASS -- The data tabulated in paragraph 4 relate to the ultraviolet solar rays of wavelengths less than 3100A which are largely shut out by average window glass, and which are known to have special therapeutic properties.

On the other hand, considering the long wavelength ultraviolet rays extending from 3100 to 4000A, which are transmitted by window glass, but which are not considered as having special health-giving properties, the transmissions are as follows:

Quartzglass and Corex	92 per cent
Vitaglass	88 "
Quartz-Lite	85 "
Window glass	83 to 85 per cent

6. The ultraviolet spectral transmissions given in the attached graph were determined by using monochromatic light from a quartz mercury arc lamp. The same transmission curves would have been obtained by using monochromatic light from any other source.

The samples of window glass used in these tests came from the supply in this Bureau's carpenter shop. They had closely the same thickness (3mm) and were selected to show that the most greenish tinted samples absorb the greatest amount of ultraviolet radiation.

From a comparison of the spectral transmission curves, an estimate can be formed regarding the therapeutic value of the various glasses.

7. The infrared spectral transmissions of the various glasses are closely the same as that of window glass to 3μ, beyond which wavelength the question of transparency is unimportant, since the atmosphere absorbs the solar rays of greater wavelength.

8. Attention is to be directed to the fact that in some of these glasses the high transparency to the extreme ultraviolet rays is obtained partly by reducing the thickness. Hence, in installing such glass, attention should be given to the use of the proper size of sash to meet the safety requirements.

SPECTRAL TRANSMISSION

B. S. TEST NO. ..... DATE 7-25-27 DET'M'N N.....

INST'MT Thermopile METHOD Radiometric WAVE LENGTH (METERS×10⁻⁹)

SAMPLE .....

OBSERVER ..... PLOTTED BY .....

CHECKED BY .....

GOVERNMENT PRINTING OFFICE