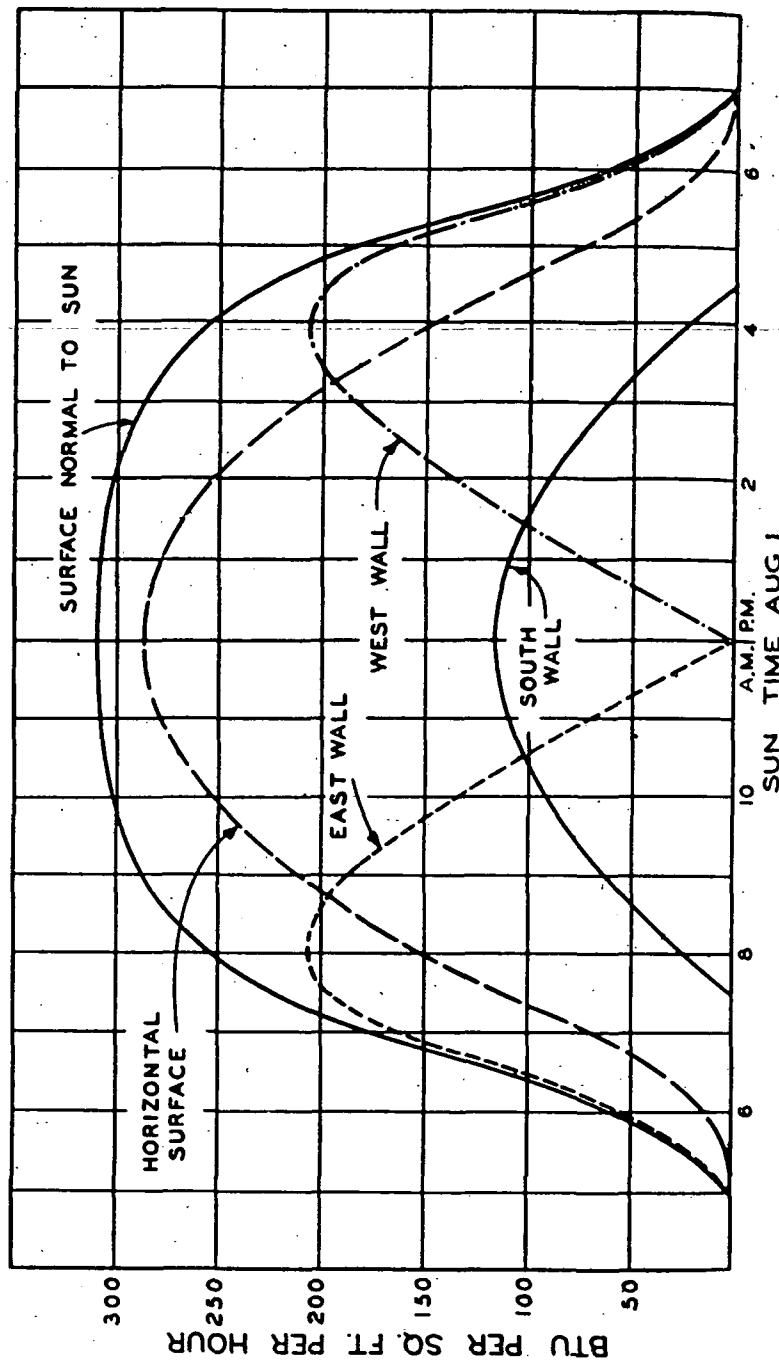

the character and thickness of the glass and the angle between the rays of sunlight and the glass. The temperature of the glass is raised by the absorbed heat and this heat is then delivered to the air on the two sides of the glass in proportion to the difference between glass and air temperatures.

The A.S.H.V.E. tests indicated that a single pane of double strength glass 0.127 in. thick absorbs approximately 11 per cent of the solar radiation passing through it when the impingement is normal. For smaller angles of impingement, the glass retards percentages of the total radiant energy approximately in proportion to the sine of the angle. Other experiments[4] indicate a glass absorption of 16.7 per cent for one pane of glass and 37.5 per cent for two ¼-in. panes separated by a 1¾-in. air space.

The amount of solar radiation delivered to an unshaded glass surface may be obtained from the curves in Fig. 1. For surfaces other than those given, the solar radiation incident to the glass must be calculated. Hendrickson and Walker[5] have shown how this may be done if the wall faces some direction other than east, west, or south. They have also shown how to calculate the net glass area on which the solar radiation impinges when the glass is partly shaded by the frame or wall. The values from Fig. 1 must be used only for the net glass area on which the sun shines. Recent tests at the A.S.H.V.E. Research Laboratory[6] have determined the percentage of heat from solar radiation actually delivered to a room with bare windows and with various types of outdoor and indoor shading. The data in Table 4 are taken from these tests.

TABLE 4. SOLAR RADIATION TRANSMITTED THROUGH BARE AND SHADED WINDOWS

	PER CENT DELIVERED TO ROOM
Bare window glass	97
Canvas awning	28
Inside shade, fully drawn	45
Inside shade, one-half drawn	68
Inside Venetian blind, fully covering window	58
Outside Venetian blind, fully covering window	22

The percentage figures in this table were obtained by dividing the total amount of heat actually entering through the shaded window by the total amount of heat calculated to enter through a bare window (solar radiation plus glass transmission based on observed outside glass temperature). For bare windows on which the sun shines, the transmission of heat from outside air to glass is small as the glass temperature is raised by the solar radiation absorbed. Therefore, in calculating the total heat gain through windows on the sunny sides of buildings, it is sufficiently accurate to figure the total cooling load due to the window, as the solar radiation times the proper factor from Table 4, and to neglect the heat

[4]Summer Cooling for Comfort as Affected by Solar Radiation, by G. A. Hendrickson and J. H. Walker, *Heating and Ventilating*, November, 1932, and The Determination of Sun Effect on Summer Cooling Loads, by G. A. Hendrickson and J. H. Walker, *Heating and Ventilating*, June, 1933.

[5]Studies of Solar Radiation Through Bare and Shaded Windows, by F. C. Houghten, Carl Gutberlet, and J. L. Blackshaw (A.S.H.V.E. Journal Section, *Heating, Piping and Air Conditioning*, February, 1934).