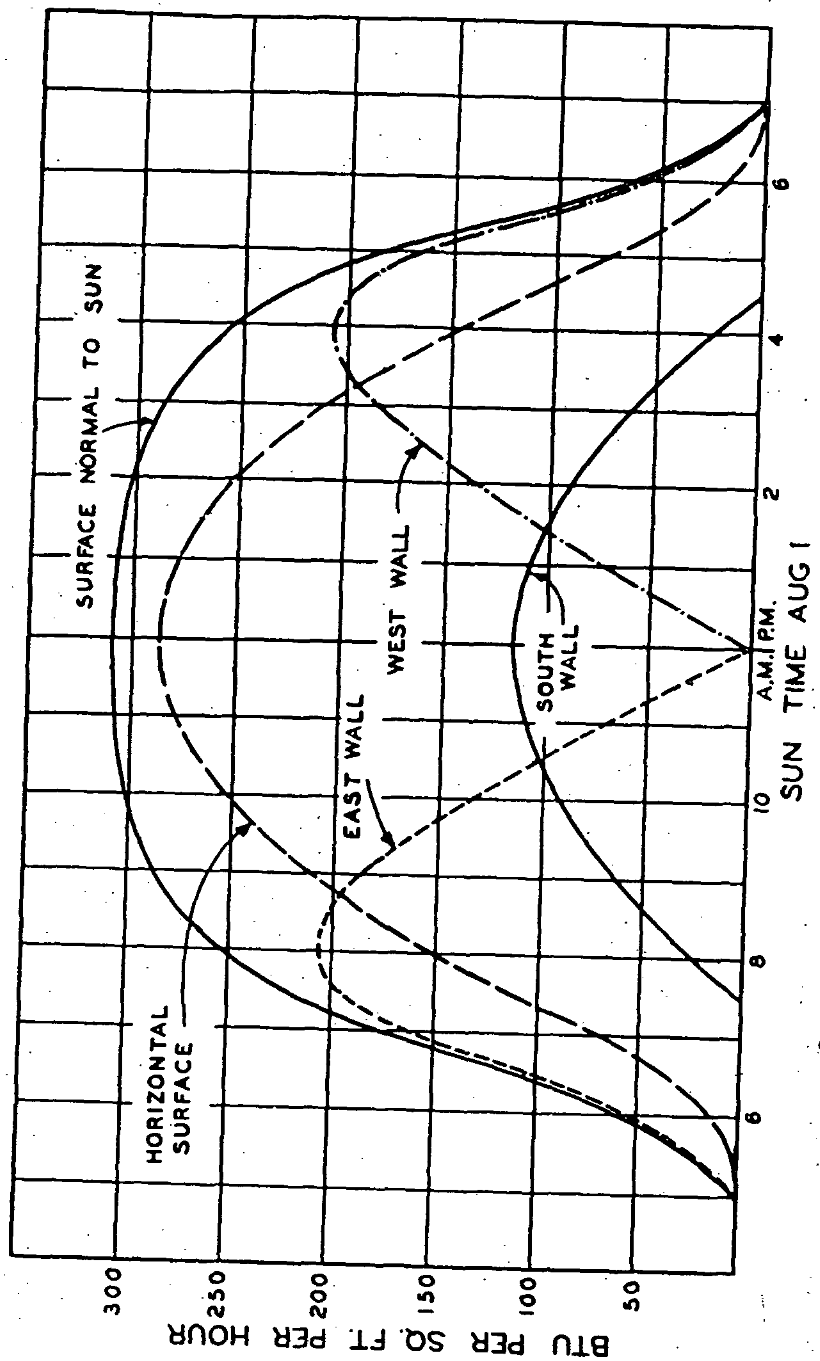

Fig. 1. Curves Giving Solar Intensity Normal to Sun, on Horizontal Surface and on Walls for August 1

that ordinary double strength window glass transmits no measurable amount of energy radiated from a source at 500 F or lower; that it transmits only 6.0 and 12.3 per cent of the total radiation from surfaces at 700 F and 1000 F, respectively; and that it transmits 65.7 per cent of the radiation from an arc lamp, 76.3 per cent of the radiation from an incandescent tungsten lamp, and 89.9 per cent of the radiation from the sun. Thus, glass windows in a room constitute heat traps, which allow rather free transmission of radiant energy into the room from the sun to warm objects in it, but do not allow the transmission of re-radiated heat from these same objects.

Some recent tests[3] indicated that sunshine through window glass is the most important factor to contend with in the cooling of an office building. At times it was shown to account for as much as 75 per cent of the total cooling necessary. Because of the importance of the sunshine load, cooling systems should be zoned so that the side of the building on which the sun is shining can be controlled separately from the other sides of the building. If buildings are provided with awnings so that the window glass is shielded from sunshine, the amount of cooling required will be reduced and there will also be less difference in the cooling requirements of different sides of the building.

Where the glass area is not great, the rule-of-thumb method of adding an arbitrary 25 F to the design dry-bulb temperature difference may be applied. The heat flow may then be figured as if there were no sun effect.

Heat and Moisture Leakage

An allowance must be made for the heat and moisture in the outside air introduced for ventilating purposes or entering the building through cracks, crevices, doors, and other places where infiltration might occur. The volume of air entering due to infiltration may be estimated from data given in Chapter 6, and information on the amount of outside air required for ventilation will be found in Chapter 2.

The heat gain resulting from the outside air introduced may be estimated from the following formula:

$$H_i = Qd_o\,(\Theta_o - \Theta) \qquad (2)$$

where

H_i = heat to be removed from outside air entering the building, Btu per hour.
Q = volume of outside air entering the building, cubic feet.
d_o = density of outside air, pounds per cubic foot, at the temperature t_o.
Θ_o = heat content of mixture of outside dry air (at temperature t_o) and water vapor, Btu per pound of dry air.
Θ = heat content of mixture of inside dry air (at temperature t) and water vapor, Btu per pound of dry air.

Heat and Moisture Sources

Figs. 4 to 7, Chapter 2, show the heat and moisture given off by human beings under various conditions of activity. For average conditions where

[3]Footnote p. 119.