can be eliminated and the value of the transmission coefficient for a simple wall x inches thick is

$$U = \frac{1}{\frac{1}{K_1} + \frac{1}{K_2} + \frac{x}{C}} \qquad (5)$$

and for a compound wall of several materials having thickness in inches of x_1, x_2, x_3, etc., the coefficient is

$$U = \frac{1}{\frac{1}{K_1} + \frac{1}{K_2} + \frac{x_1}{C_1} + \frac{x_2}{C_2} + \frac{x_3}{C_3} + \text{etc.}} \qquad (6)$$

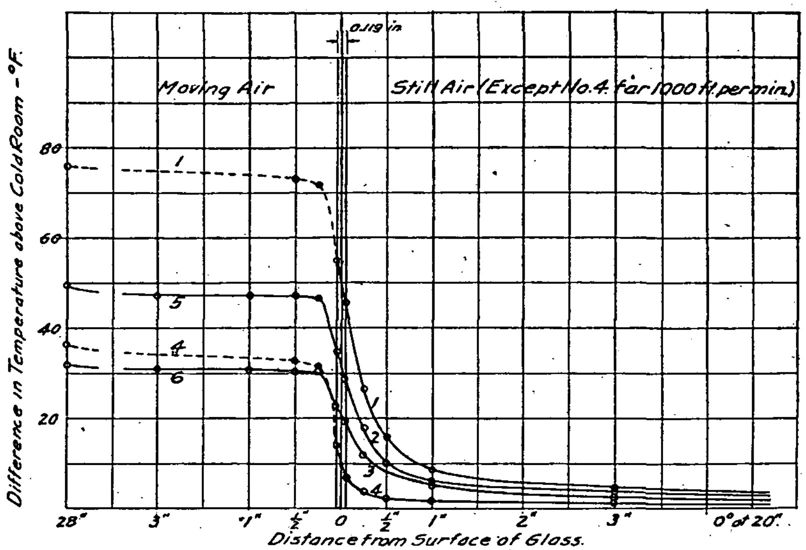

FIG. 2. TEMPERATURE GRADIENT CURVES FOR GLASS (TAKEN FROM BULLETIN NO. 24, ENGRG. EXP. STA., PENNSYLVANIA STATE COLLEGE)

As in the case of the simple wall, K_1 and K_2 are always the inside and outside surface coefficients for the two materials in contact with air. If the air is still (no wind), then for the same material K_1 and K_2 are the same, and $K_1 = K_2$; but if the outside air is in motion then K_2 is always greater than K_1 and will increase as the wind velocity increases. Values for K_1 in still air as determined by various investigators are given in Table 4. Values for C, the conductivity of building materials, are given in Table 5, and are taken from the published values of various investigators. It should be noted that values of C as well as U are dependent on the temperature range, and it is therefore desirable that the investigator determine conductivity values when the wall is subjected to an air temperature of about 70 deg. fahr. on the inside and about zero on the outside.

TABLE 4. SURFACE COEFFICIENTS (K_1) FOR VARIOUS BUILDING MATERIALS UNDER STILL AIR (NO WIND) CONDITIONS

The values in the table are in B.t.u. per square foot of wall surface per hour per 1 deg. fahr. difference between the mean air temperature in the room and the inside surface temperature of the wall.

Building Material	Surface Coefficient K_1 (Still Air) Harding and Willard	Wood
Asbestos (sheet)	1.40	......
Brickwork (ordinary)	1.40	......
Cement Plaster (finished)	0.93	......
Concrete	1.30	......
Corkboard	1.25	1.20
Glass (window)	1.50	1.90*
Magnesia (blocks)	1.45	......
Wood (finished surface)	1.40	......
Building paper	......	1.40
Average of all values	1.34	......

*Average of both sides of glass 0.12 in. thick and for 70 deg. fahr. total temperature difference from air to air with moving air on one side. Probable value for still air on both sides 1.60.

In the case of air space construction, two additional surface coefficients for each air space must be inserted in either equation (5) or (6). These surface coefficients may be taken the same as the K_1 (still air) values for the materials forming the sides of the air spaces; thus for a simple wall with one air space,

$$U = \frac{1}{\frac{1}{K_1} + \frac{1}{K_2} + \frac{1}{K_1} + \frac{1}{K_1} + \frac{x}{C}} \qquad (7)$$

or

$$= \frac{1}{\frac{3}{K_1} + \frac{1}{K_2} + \frac{x}{C}} \qquad (8)$$

With certain very special forms of construction which have irregular air spaces, it is necessary to use the conductivity for the unit construction as actually assembled in the wall. This condition exists when hollow tile is used as furring, in which case $\frac{x_1}{C_1}$ is replaced by $\frac{1}{C_u}$, where C_u is the unit conductivity. (*See footnote 2 of Table 5.*)

Heat Transmission Data

As previously stated heat transmission coefficients of many common types of building construction are given in Tables 7 to 13, inclusive, each construction being identified by a serial number. For example, in Table 7-A, the coefficient of transmission (U) of a 13-in. brick wall, furring strips, and ¾ in. of gypsum plaster on metal lath, is 0.185, and the number assigned to a wall of this construction is 3-b.

The coefficients in these tables were determined by computations similar to those shown in Fig. 3, using the value of C (or C_u) indicated[3]. The authorities for the conductivities used for computing these coefficients

[3]C_u is the conductivity (or conductance) for construction or thickness stated.