

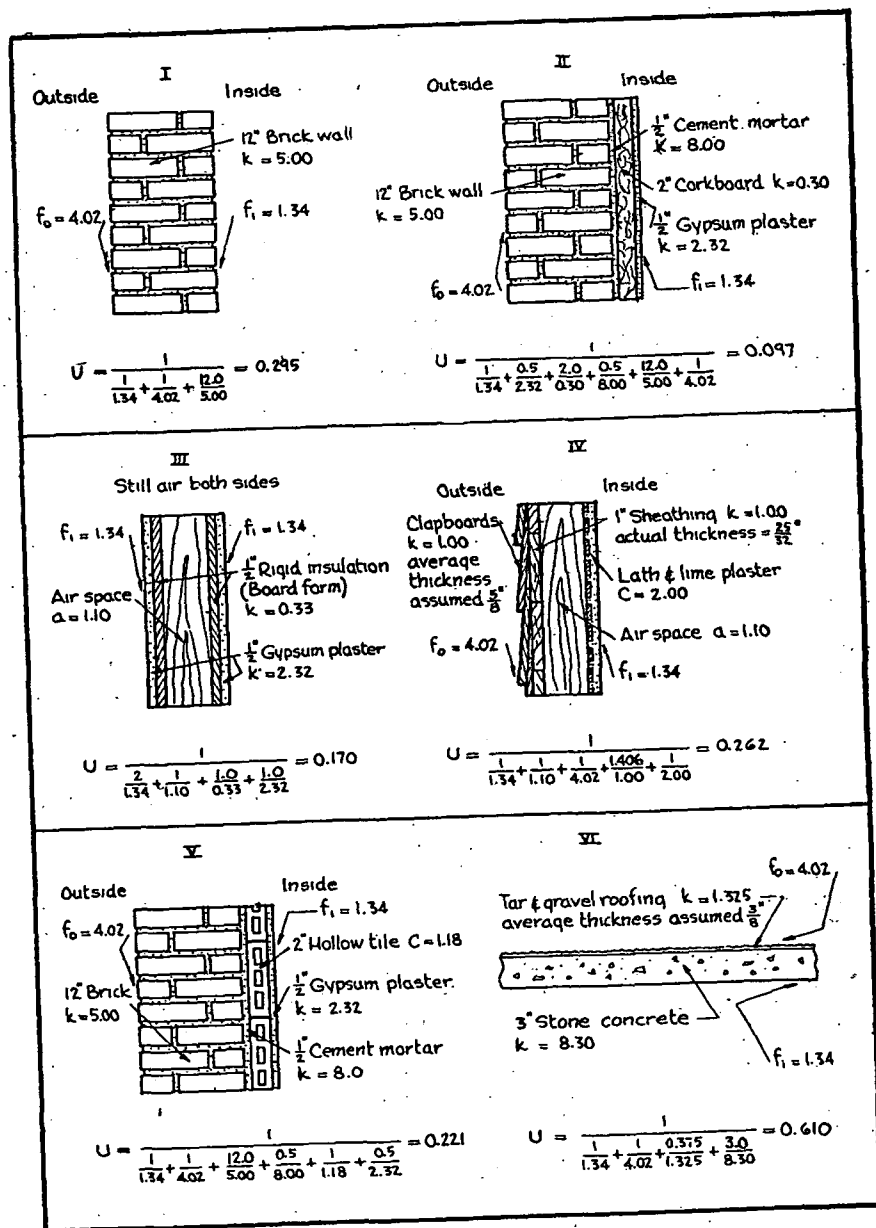


FIG. 2. EXAMPLES SHOWING METHOD OF COMPUTING HEAT TRANSMISSION COEFFICIENTS OF VARIOUS TYPES OF CONSTRUCTION

efficient of transmission (U) of a 12-in. brick wall, furring strips, and $\frac{3}{4}$ -in. of gypsum plaster on metal lath, is 0.216, and the number assigned to a wall of this construction is 3-B, Table 9.

The coefficients in these tables were determined by computations similar to those shown in Fig. 2, using the value of k (or C) indicated. The authorities for the conductivities used for computing these coefficients are given in Tables 4, 5, 6, 7 and 8. As in the case of the examples in Fig. 2, the average value of 1.34 given in Table 1 for f_i was used for all surfaces in still air. The value of f_o for outside wall and roof surfaces was taken as $3 \times f_i$, or 4.02, corresponding to a wind velocity of approximately 15 miles per hour. The conductance of air spaces $\frac{1}{2}$ in. or more in width was taken to be 1.10 Btu per hour per square foot per degree Fahrenheit difference between the two sides enclosing the air space. (See Table 3.)

Problems involving the determination of the value of U from the conductivity constants can also be solved by what is sometimes known as the resistance method which is readily derived from the basic equation No. 5 as follows:

$$\frac{1}{U} = \frac{1}{f_i} + \frac{1}{f_o} + \frac{x}{k} = \Sigma [R_i + R_o + R_r] \quad (9)$$

The internal resistance of a material is equal to the reciprocal of its so-called internal conductivity (k) multiplied by its thickness and is represented by the fraction $\frac{x}{k}$, or $\frac{1}{C}$, in the case of materials for which the conductance is given in terms of the construction or thickness stated. For example: The internal resistance of 12 in. of brickwork on the basis of a value of k of 5.0 is $\frac{12}{5}$ or 2.40. The internal resistance of 2-in. hollow clay tile based on the value of C of 1.18 is $\frac{1}{1.18}$ or 0.847.

In the resistance method, the sum of the internal resistances of all the materials entering into the construction, is added to the sum of the surface resistances, which are the reciprocals of the surface coefficients or $\frac{1}{f}$. The resistance of a surface in still air, based on the average value of f_i or 1.34 is $\frac{1}{1.34}$ or 0.746. The resistance of an outside surface exposed to the wind, based on the average value of f_o or 4.02 (3×1.34) is $\frac{1}{4.02}$ or 0.249. The computed value of U obtained by the resistance method is obtained by taking the reciprocal of the sum of the internal and surface resistances of the construction. The solution of Example V in Fig. 2, by means of the resistance method is given in the summary on page 33.