MATERIAL	THICKNESS INCHES	INTERNAL CONDUCTIVITY OR CONDUCTANCE	SURFACE COEFFICIENTS f_i or f_o	INTERNAL RESISTANCE	SURFACE RESISTANCE
Brickwork	12	5.0 (k)	4.02 (f_o)	2.400	0.249
Cement Mortar	½	8.0 (k)	....	0.063	....
Hollow Clay Tile	2	1.18 (C)	....	0.847	....
Plaster (gypsum)	½	2.32 (k)	1.34 (f_i)	0.215	0.746
				3.525	0.995
					3.525
Total resistance (R)					4.520

$U = \frac{1}{R} = \frac{1}{4.520} = 0.221$ B.t.u. per hour per square foot per 1 deg. fahr. difference in temperature between the air on the two sides of the wall.

In computing heat transmission coefficients of floors laid directly on the ground (Table 28), only one surface coefficient (f_i) is used. For example, the value of U for a 1 in. yellow pine floor (actual thickness, 25/32 in.) placed directly on 5 in. concrete on the ground, is determined as follows:

$$U = \frac{1}{\frac{1}{1.34} + \frac{0.781}{1.00} + \frac{5.0}{8.30}} = 0.472 \text{ B.t.u. per hour per square foot}$$

per 1 deg. fahr. difference in temperature between the ground and the air immediately above the floor.

The thicknesses upon which the coefficients in Tables 9 to 33, inclusive, are based, are as follows:

Brick veneer	4 in.
Plaster and metal lath	¾ in.
Plaster (on wood lath, plasterboard, rigid insulation, board form, or corkboard)	½ in.
Slate (Roofing)	½ in.
Stucco on wire mesh reinforcing	1 in.
Tar and gravel or slag-surfaced built-up roofing	⅜ in.
Wood shingles (average thickness)	⅝ in.
Wood siding or clapboard (average thickness)	⅝ in.
1-in. Lumber (S-2-S)	25/32 in.
1½-in. Lumber (S-2-S)	1 5/16 in.
2-in. Lumber (S-2-S)	1⅝ in.
2½-in. Lumber (S-2-S)	2⅛ in.
3-in. Lumber (S-2-S)	2⅝ in.
4-in. Lumber (S-2-S)	3⅝ in.
Finish flooring (Maple or Oak)	13/16 in.

Note that actual thicknesses of lumber are used in the computations rather than nominal thicknesses.

On account of the fact that the internal resistances of metal and single thicknesses of building paper (used because of its value as a wind stop only) and roofing felt are very small, these resistances were neglected in the calculations, in accordance with standard practice. The computations for wood shingle roofs applied over wood stripping are based on 1 by 4 in. wood strips, spaced 2 in. apart. Since no reliable figures are available

concerning the conductivity of Spanish and French clay roofing tile, of which there are many varieties, the figures for such types of roofs were taken the same as for slate roofs, as it is probable that the values of U for these two types of roofs will compare favorably.

The coefficients of transmission of the pitched roofs in Table 31 apply where the roof is over a heated attic or top floor, such that the heat passes directly through the roof structure including whatever finish, if any, is applied to the underside of the roof rafters. By a heated attic is meant an attic to which heat is supplied directly from the furnace or boiler by means of radiators, warm-air registers, or other means.

If the attic is unheated, the roof structure and ceiling of the top floor must both be taken into consideration, and the combined coefficient of transmission determined. The formula for calculating the combined coefficient of transmission of a top-floor ceiling, unheated attic space and pitched roof, per square foot of roof area, is as follows:

$$U = \frac{U_r \times U_{ce}}{n \times U_r + U_{ce}} \quad (10)$$

where

U_r = coefficient of transmission of the roof.
U_{ce} = coefficient of transmission of the ceiling.
n = the ratio of the area of the roof to the area of the ceiling.

In using this formula, a correction-factor must be applied. As the amount of heat transferred through an air space is proportional to the difference of the fourth powers of the absolute temperatures of the surfaces enclosing the air space, a greater amount of heat is absorbed or emitted by radiation by the surfaces enclosing an unheated attic than by the surfaces of a wall or ceiling in a room under still-air conditions, where the surrounding objects are only slightly higher in temperature than the interior surfaces of the walls and ceiling. For example: According to the most reliable information at present available, the average coefficient of a surface in still air is 1.34 B.t.u. per hour per square foot per degree fahrenheit, whereas the average coefficient of an air space in an outside wall is about 1.10 B.t.u. per hour per square foot per degree fahrenheit difference between the two surfaces, at a mean temperature of 40 deg. fahr. An air space coefficient of 1.10 is equivalent to a surface coefficient of 2.20 for each of the two surfaces enclosing the air space, where the overall transmission is computed by using the coefficients of the two surfaces enclosing the air space instead of the coefficient of the air space itself. Hence, in determining the values of U_r and U_{ce} to be used in the formula, the coefficients for the surfaces of the roof and ceiling enclosing the attic should be increased to allow for the additional amount of heat transferred by radiation, and a coefficient of 2.20 may be used with sufficient accuracy for each of these surfaces, although in very precise work a correction should be made to allow for the fact that the area of a pitched roof over an unheated attic is greater than the area of the ceiling, and hence, the amount of heat absorbed by radiation by each square foot of roof surface is less than is given off by radiation by each square foot of ceiling surface.

The following example will illustrate the use of this formula: Determine the combined coefficient of transmission of a roof constructed of asbestos