TABLE 33. COEFFICIENTS OF TRANSMISSION (U) OF DOORS, WINDOWS AND SKYLIGHTS

Note.—THESE COEFFICIENTS ARE BASED ON A WIND EXPOSURE OF 15 MILES PER HOUR, AND ARE EXPRESSED IN B.T.U. PER HOUR, PER SQUARE FOOT, PER DEG. FAHR. DIFFERENCE IN TEMPERATURE BETWEEN THE AIR INSIDE AND OUTSIDE OF THE DOOR, WINDOW OR SKYLIGHT.

A. Windows and Skylights

	U
Single	1.13[a-c]
Double	0.45[a]
Triple	0.281[a]

B. Solid Wood Doors[b-c]

NOMINAL THICKNESS INCHES	ACTUAL THICKNESS INCHES	U
1	$^{25}/_{32}$	0.563
1¼	1$^{1}/_{16}$	0.485
1½	1$^{5}/_{16}$	0.432
1¾	1$^{3}/_{8}$	0.421
2	1$^{5}/_{8}$	0.382
2½	2$^{1}/_{8}$	0.321
3	2$^{5}/_{8}$	0.277

[a] See page 212, Volume I, *Mechanical Equipment of Buildings*, by Harding and Willard, second edition, 1929.

[b] Computed using $C = 1.0$ for wood; $f_i = 1.34$ and $f_o = 4.02$.

[c] It is sufficiently accurate to use the same coefficient of transmission for doors containing thin wood panels, as that of single panes of glass, namely, 1.13 B.t.u. per hour per square foot per 1 deg. fahr. difference between inside and outside air temperature.

If the allowance on the reduction in the radiation required for this building is $1.00 per square foot, the monetary value of the radiation saving will be $468.00, which if credited to the insulation, will leave a net cost of the insulation of $0.11 × 10,000 or $1,100.00 minus $468.00 or $632.00, and the annual return on the investment, taking both the fuel and radiation savings into consideration, will be $100 \times \frac{\$10.00 \times 17}{\$632.00}$ or 27 per cent, neglecting insurance and depreciation.

The radiation saving for a hot water or vapor system can be estimated by substituting the proper heat emission factor in the denominator of equation (16) for the value of 240 for steam. This heat emission factor varies with the heat dissipation coefficient of the radiator and the temperature difference between the medium in the radiator and the air surrounding it and is about 160 for hot water. However, it is obvious that the same factor should be used for estimating the radiation saving with insulation as was used for designing the heating system.

Chapter 4

HEAT LOSSES BY INFILTRATION

Causes of Air Leakage; Infiltration through Walls; Infiltration through Windows; Wind Velocity; Amount of Crack; Air Change Method; Heat Required for Warming Up Air Entering by Infiltration.

IN addition to the heat transmission of the walls, glass and roof, consideration must always be given to the inleakage of cold outside air which must be heated to room temperature. This inleakage or infiltration is exclusive and independent of air that may be supplied for ventilation through ducts or flues of any sort. Calculation of the heat required for this purpose is a very simple matter if the volume of air leaking into the building per hour is known.

CAUSES OF AIR LEAKAGE

A building is a shell in which the internal pressure in general is not in equilibrium with the external pressure. At some places, the latter is greater than the former, and inflow will occur in such regions through any openings in the wall whether large or small. At other places the reverse is true. The internal pressure automatically assumes a value to correspond to the requirement that outflow must equal inflow. The agencies that cause leakage are the natural forces of wind and temperature difference, and those produced by fans if any are used. A consideration of all factors involved in causing pressure difference at various places about a building would present an exceedingly complex problem.

In tall single story buildings, the *chimney effect* caused by the inside-outside temperature difference becomes a factor of importance. Even in multi-story buildings it usually is not possible to isolate the several floors completely, and chimney effect is operative to a considerable degree, tending to force air in at the lower levels and out at the upper. Ventilating systems usually are designed to give a neutral pressure in the rooms, and fan pressures therefore have little effect upon infiltration.

Since the full force of the wind usually is not the effective pressure differential, owing to back pressure built up within the building, the actual amount of infiltration (cubic feet) is assumed to be 80 per cent of that determined in laboratory experiments, which means that the pressure drop is assumed to be about 64 per cent of the full wind pressure.