although at present data are lacking for accurately evaluating the effect of heat capacity on the refrigerating requirements of air-conditioned buildings. If the maximum interior surface temperature is known, the heat transfer may be estimated by means of the following formula:

$$H = (t_s - t) \times f_i \qquad (14)$$

where

t_s = Maximum interior surface temperature.
f_i = Interior surface conductance.

For a further discussion of *heat capacity*, see p. 16, Chapter 2.

Chapter 4

AIR LEAKAGE FROM BUILDINGS

Causes of Air Leakage; Infiltration Through Walls; Infiltration Around Windows; Tall Buildings; Air Change Method; Heat Required for Warming Air Entering by Infiltration.

THE leakage of air from buildings constitutes a major source of heat loss and depends primarily on the tightness of the construction. This outleakage of heated air is accompanied by a corresponding inleakage or infiltration of cold air which must be warmed to the room temperature and which must be included in the heat loss calculations, as described in Chapter 2.

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.

INFILTRATION THROUGH WALLS

Table 1 gives data on infiltration through brick and frame walls. From the results of recent experiments[1], it appears that the data in Table 1

[1] *Air Infiltration through Various Types of Brick Wall Construction*, by Larson, Nelson and Braatz (A.S.H.V.E. TRANSACTIONS, Vol. 36, 1930).