buildings by an amount ranging from 5 per cent to 20 per cent. This extra heating surface is required only on the windward side and on windy days, and hence automatic temperature control is especially desirable with such installations.

In stair-wells that are open through many floor levels although closed off from the remainder of each floor by doors and partitions, the stratification of air makes it advisable to increase the amount of heating surface at the lower levels and to decrease the amount at higher levels even to the point of omitting all heating surface on the top several floor levels. One rule is to calculate the heating surface of the entire stair-well in the usual way and to place 50 per cent of this in the bottom third, the normal amount in the middle third and the balance in the top third.

HEAT EQUIVALENT OF AIR INFILTRATION

Sensible Heat Loss

The heat required to warm cold outside air, which enters a room by infiltration, to the temperature of the room is given by the equation:

$$H_s = 0.24\ Q\ d\ (t_i - t_o) \qquad (3)$$

where

H_s = heat required to raise temperature of air leaking into building from t_o to t_i Btu per hour.
0.24 = specific heat of air.
Q = volume of outside air entering building, cubic feet per hour.
d = density of air at temperature t_o, pounds per cubic foot.
t_i = room air temperature, degrees Fahrenheit.
t_o = outside air temperature, degrees Fahrenheit.

Latent Heat Loss

When it is intended to add moisture to air leaking into a room for the maintenance of proper winter comfort conditions, it is necessary to determine the heat equivalent to evaporate the required amount of water vapor, which may be calculated by the equation:

$$H_l = Q\ d \left(\frac{M_i - M_o}{7000}\right) L \qquad (4)$$

where

H_l = heat required to increase moisture content of air leaking into building from M_o to M_i, Btu per hour.
Q = volume of outside air entering building, cubic feet per hour.
d = density of air at temperature t_i, pounds per cubic foot.
M_i = vapor density of inside air, grains per pound of dry air.
M_o = vapor density of outside air, grains per pound of dry air.
L = latent heat of vapor at M_i, Btu per pound.

It is sufficiently accurate to use $d = 0.075$ lb, in which case equation 3 reduces to 5 and if the latent heat of vapor is assumed for general conditions as 1060 Btu per pound Equation 4 reduces to 6.

$$H_s = 0.018\ Q\ (t_i - t_o) \qquad (5)$$

$$H_l = 0.0114\ Q\ (M_i - M_o) \qquad (6)$$

Changing the temperature and vapor subscripts in Equations 5 and 6 to $(t_o - t_i)$ and $(M_o - M_i)$ permits the use of these same formulas for determining the sensible and latent heat gains due to infiltration in cooling load computations.

If a building has more than one room which is divided by interior walls or partitions, it is sufficiently accurate to use half of the total infiltration losses for determining the total heat requirements. Where buildings have no interior walls, the infiltration losses are calculated by using one-half of the total crack, in which case the entire infiltration loss should be considered.

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