HEAT AND MOISTURE LOSSES

In order to solve air conditioning problems involving the human body it is necessary to know the rate at which sensible and latent heat are given up by the body under various conditions of temperature and activity. Research at the A.S.H.V.E. Laboratory [32, 36] has resulted in the data given in Figs. 9, 10, and 11. Table 3 gives the metabolic rates for various degrees of activity.

The experimental data from which the curves were drawn show that

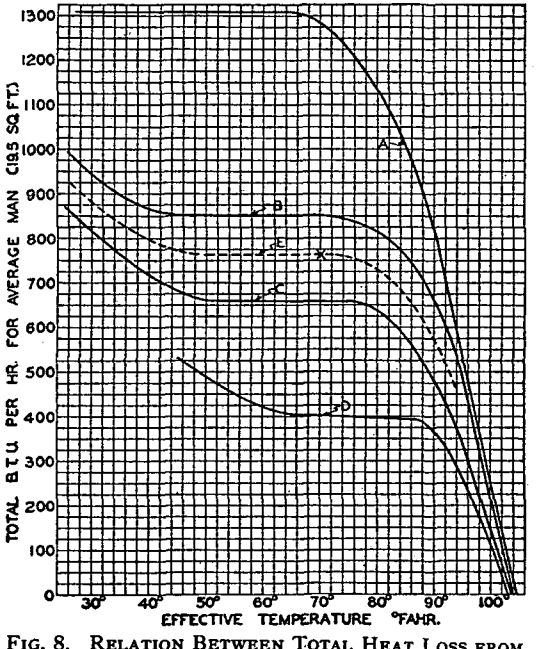

FIG. 8. RELATION BETWEEN TOTAL HEAT LOSS FROM THE HUMAN BODY AND EFFECTIVE TEMPERATURE FOR STILL AIR[a]

[a]Curve *A*—Men working 66,160 ft-lb per hour. Curve *B*—Men working 33,075 ft-lb per hour. Curve *C*—Men working 16,538 ft-lb per hour. Curve *D*—Men seated at rest. Curves *A* and *C* drawn from data at an effective temperature of 70 deg only and extrapolating the relation between curves *B* and *D*, which were drawn from data at many temperatures.

total heat loss does not vary appreciably within the comfort zone (see Fig. 8). Above or below this range the variation is approximately a function of effective temperature. Sensible and latent heat losses (Figs. 9 and 11) on the other hand, vary greatly within the comfort zone, the variation following closely the dry-bulb temperature.

Although total heat loss and sensible and latent heat losses are not exact functions of effective and dry-bulb temperature, respectively, for all

[32]Thermal Exchanges Between the Bodies of Men Working and the Atmospheric Environment, by F. C. Houghten, W. W. Teague, W. E. Miller, and W. P. Yant (*American Journal of Hygiene*, Vol. XIII, No. 2, March, 1931, pp. 415-431).

conditions of humidity and air motion, they are plotted as such in the curves. This is accomplished by approximations which are sufficiently accurate for application to practical problems. Comparison of Figs. 9 and 10 shows how the cooling load may vary between sensible and latent heat elimination for different atmospheric conditions and activities of occupants.

An atmospheric condition resulting in sensible perspiration is to be

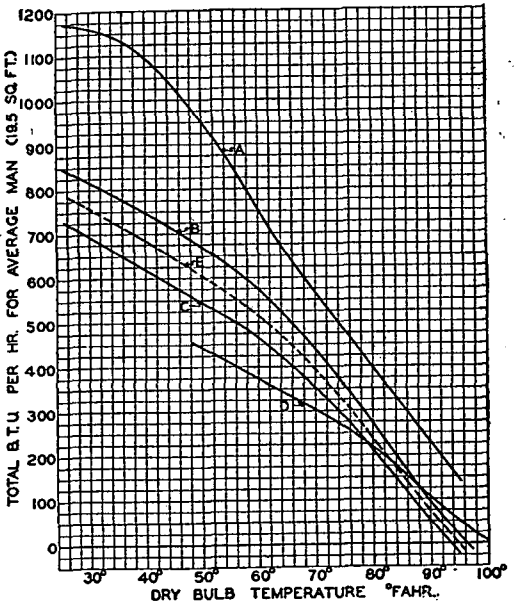

FIG. 9. RELATION BETWEEN SENSIBLE HEAT LOSS FROM THE HUMAN BODY AND DRY-BULB TEMPERATURE FOR STILL AIR[a]

[a]Curve *A*—Men working 66,150 ft-lb per hour. Curve *B*—Men working 33,075 ft-lb per hour. Curve *C*—Men working 16,538 ft-lb per hour. Curve *D*—Men seated at rest. Curves *A* and *C* drawn from data at a dry-bulb temperature of 81.3 F only and extrapolating the relation between curves *B* and *D* which were drawn from data at many temperatures.

avoided for obvious reasons. Tables 4 and 5 give the approximate effective temperatures at which perspiration is noticeable in different degrees for 95 per cent and 20 per cent relative humidity.

In theaters, auditoriums, department stores and other crowded enclosures, the amount of heat and moisture given off by the people is so large that normal changes in outside temperature and humidity have relatively little effect on indoor air conditions. The principal object of air conditioning in such places is to remove excessive heat and moisture by supplying a sufficient quantity of properly conditioned air. The indoor air conditions, however, must be varied according to the outside temperature, as has been pointed out.