

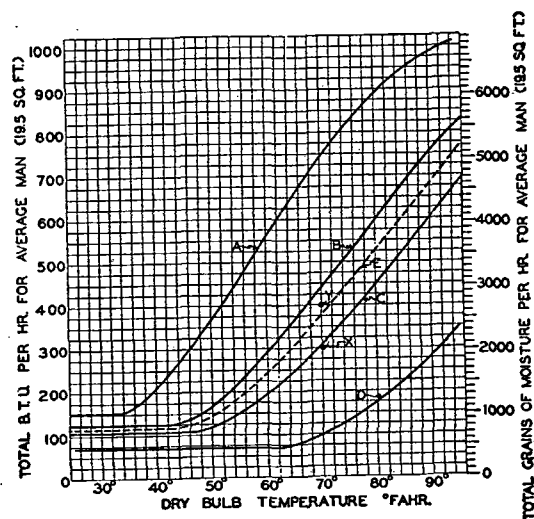


FIG. 10. LATENT HEAT AND MOISTURE LOSS FROM THE HUMAN BODY BY EVAPORATION, IN RELATION TO DRY-BULB TEMPERATURE FOR STILL AIR CONDITIONS^a

^aCurve 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.

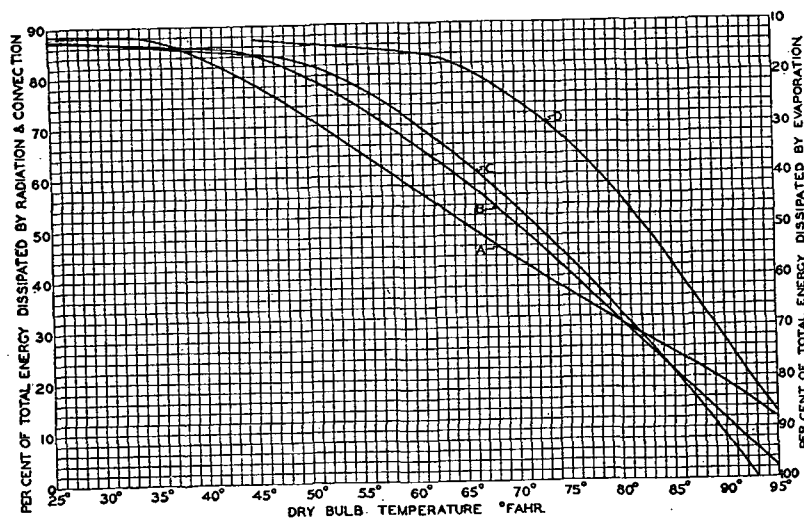


FIG. 11. HEAT LOSS FROM THE HUMAN BODY BY EVAPORATION, RADIATION AND CONVECTION IN RELATION TO DRY-BULB TEMPERATURE FOR STILL AIR CONDITIONS^a

^aCurve 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.

NATURAL AND MECHANICAL VENTILATION

Under favorable conditions natural ventilation methods properly combined with means for heating may be sufficient to provide for the foregoing objectives in homes, uncrowded offices, small stores, etc.

In large offices, large school rooms, and in public and industrial buildings, natural ventilation is uncertain and makes heating difficult. The chief disadvantage of natural methods is the lack of control; they depend largely on weather and upon the velocity and direction of the wind. Rooms on the windward side of a building may be difficult to heat and ventilate on account of drafts, while rooms on the leeward side may not receive an adequate amount of air from out-of-doors. The partial vacuum produced on the leeward side under the action of the wind may even reverse the flow of air so that the leeward half of the building has to take the *drift* of the air from the rooms of the windward half. Under such conditions no outdoor air would enter through a leeward window opening, but room air would pass out.

In warm weather natural methods of ventilation afford little or no control of indoor temperature and humidity. Outdoor smoke, dust and noise constitute other limitations of natural methods.

RECIRCULATION AND OZONE

The amount of recirculated air may be varied to suit changes in weather and seasonal requirements, so as to conserve heat in winter and refrigeration in summer, but the saving in operating cost should not be obtained at the expense of air quality.

Ozone has been used for deodorizing recirculated air by oxidation or *masking*. Under favorable conditions some success is possible but from the practical standpoint it is difficult to regulate the ozone output so as to just neutralize undesirable odors at all times during the occupancy of a room. The difficulties appear to be mainly due to a wide variability in the rate of ozone disappearance in different rooms, or in the same room at different times, according to the characteristics of a room, the absolute humidity, impurities in the air, number and type of occupants, and probably other factors which require considerable study before ozone can be safely and economically applied.

The allowable concentrations in the breathing zone are very small, between 0.01 to 0.05 parts of O_3 per million parts of air. These are much too small to influence bacteria. Higher concentrations are associated with a pungent unpleasant odor and considerable discomfort to the occupants. One part per million causes respiratory discomfort in man, headaches and depression, lowers the metabolism, and may even lead to coma⁴⁸.

Toilets, kitchens, and similar rooms, in buildings using recirculation, should be ventilated separately by mechanical exhaust in order to prevent objectionable odors from diffusing into other parts of the building.

⁴⁸The British Medical Journal. Editorial, June 25, 1932, p. 1182. See also Loc. Cit. Note 5.