

fort, the optimum conditions for health may not be identical with those for comfort. On general physiologic grounds, however, the two do not differ greatly since this is in accordance with the efficient operation of the heat regulating mechanism of the body. This belief is strengthened by results of studies on premature infants over a four-year period¹¹. By adjusting the temperature and humidity so as to stabilize the body temperature of these infants, the incidence of diarrhoea and mortality was decreased, gains in body weight increased and infections were reduced to a minimum.

Comfort Chart; Comfort Line; Comfort Zone

Fig. 2 shows a comfort chart, developed at the A.S.H.V.E. Laboratory, on which the average and extreme comfort zones have been superimposed. The *extreme comfort zone* includes air conditions in which one or more of the experimental subjects were comfortable. The *average comfort zone* includes those air conditions in which the majority of the subjects (50 per cent or more) were comfortable. That particular effective temperature at which the maximum number of subjects was comfortable was called the *comfort line*.

The *average winter comfort zone* as determined at the A.S.H.V.E. Laboratory ranges from 63 deg to 71 deg ET (effective temperature). While at rest, 97 per cent of the experimental subjects were found to be comfortable at 66 deg ET and this temperature was accepted as the *winter comfort line* or *optimum effective temperature*.

The comfort line separates the cool air conditions to its left from the warm air conditions to its right. Under the air conditions existing along or defined by the comfort line, the body is able to maintain thermal equilibrium with its environment with the least conscious sensation to the individual, or with the minimum physiologic demand on the heat regulating mechanism. This environment involves not only the condition of the air with respect to temperature and humidity, but also the condition of the surrounding objects and wall surfaces. The comfort zone tests were made in rooms with wall surface temperatures approximately the same as the room dry-bulb temperature. For walls of large area having unusually low surface temperatures, however, a somewhat higher range of effective temperature is required to compensate for the increased loss of heat from the body by radiation¹².

The average summer comfort zone for exposures of 3 hours or more ranges from about 66 deg to 75 deg ET, based on studies made at the Harvard School of Public Health¹³. The probable optimum effective temperature (for exposures of 3 hours or more) is 71 deg. These effective temperatures average about 4 deg higher than those found in winter when customary winter clothing was worn. The variation from winter to summer is probably due partly to adaptation to seasonal weather and partly to differences in the clothing worn in the two seasons.

¹¹Application of Air Conditioning to Premature Nurseries in Hospitals, by C. P. Yaglou, Philip Drinker and K. D. Blackfan (A.S.H.V.E. TRANSACTIONS, Vol. 36, 1930).

¹²Cold Walls and Their Relation to the Feeling of Warmth, by F. C. Houghten and Paul McDermott (A.S.H.V.E. Journal Section, Heating, Piping and Air Conditioning, January, 1933, p. 53).

¹³The Summer Comfort Zone; Climate and Clothing, by C. P. Yaglou and Philip Drinker (A.S.H.V.E. TRANSACTIONS, Vol. 35, 1929).

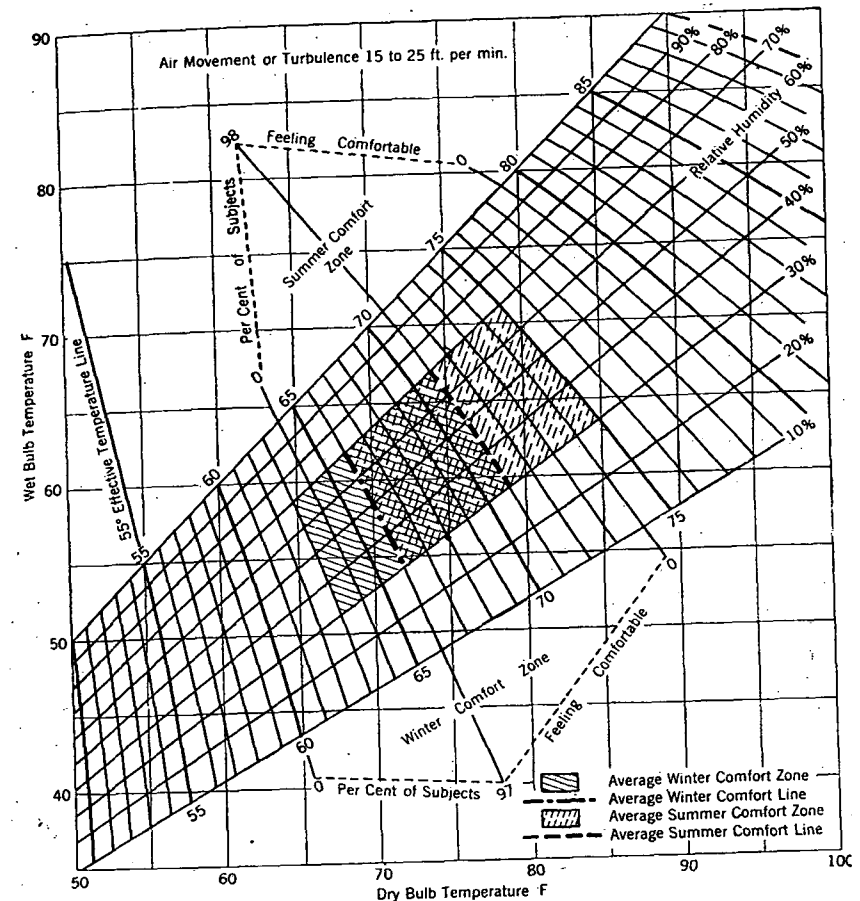


FIG. 2. A.S.H.V.E. COMFORT CHART FOR AIR VELOCITIES OF 15 TO 25 FPM (STILL AIR)¹⁴

Note.—Both summer and winter comfort zones apply to inhabitants of the United States only. Application of winter comfort line is further limited to rooms heated by central station systems of the convection type. The line does not apply to rooms heated by radiant methods. Application of summer comfort line is limited to homes, offices and the like, where the occupants become fully adapted to the artificial air conditions. The line does not apply to theaters, department stores, and the like where the exposure is less than 3 hours.

The best effective temperature (for exposures lasting 3 hours or more) was found to follow the average monthly outdoor temperature more closely than the prevailing outdoor temperature. It remained at approximately the same value in July, August and September, and although the average monthly temperature did not vary much, the prevailing outdoor temperature ranged from 70 F to 99.5 F. A decrease in the optimum

¹⁴See Report How to Use the Effective Temperature Index and Comfort Charts, (A.S.H.V.E. TRANSACTIONS, Vol. 38, 1932).