

Air Quantity

The air supply to occupied spaces must always be adequate to satisfy the physiological requirements of the occupants. It must be sufficient to maintain the desired temperature, humidity, and purity with reasonable uniformity and without drafts. In many practical instances there are two air quantities to be considered, (a) outdoor air supply, and (b) total air supply. The difference between the two gives the amount of air to be recirculated.

TABLE 3. MINIMUM OUTDOOR AIR REQUIREMENTS TO REMOVE OBJECTIONABLE BODY ODORS

(Provisional values subject to revision upon completion of work)

TYPE OF OCCUPANTS	AIR SPACE PER PERSON CU FT	OUTDOOR* AIR SUPPLY CFM PER PERSON
<i>Heating season with or without recirculation. Air not conditioned.</i>		
Sedentary adults of average socio-economic status.....	100	25
Sedentary adults of average socio-economic status.....	200	16
Sedentary adults of average socio-economic status.....	300	12
Sedentary adults of average socio-economic status.....	500	7
Laborers.....	200	23
Grade school children of average class.....	100	29
Grade school children of average class.....	200	21
Grade school children of average class.....	300	17
Grade school children of average class.....	500	11
Grade school children of poor class.....	200	38
Grade school children of better class.....	200	18
Grade school children of best class.....	100	22
<i>Heating season. Air humidified by means of centrifugal humidifier. Water atomization rate 8 to 10 gph. Total air circulation 30 cfm per person.</i>		
Sedentary Adults.....	200	12
<i>Summer season. Air cooled and dehumidified by means of a spray dehumidifier. Spray water changed daily. Total air circulation 30 cfm per person.</i>		
Sedentary Adults.....	200	<4

*Impressions upon entering room from relatively clean air at threshold odor intensity.

When the only source of contamination is the occupant, the minimum quantity of outdoor air needed appears to be that necessary to remove objectionable body odors, or tobacco smoke. The concentration of body odor in a room, in turn, depends upon a number of factors, including socio-economic status of occupants, outdoor air supply, air space allowed per person, odor adsorbing capacity of air conditioning processes, temperature, and other factors of secondary importance. With any given group of occupants and type of air conditioner the intensity of body odor perceived upon entering a room from relatively clean air was found to

vary inversely with the logarithm of outdoor air supply and the logarithm of the air space allowed per person.

The minimum outdoor air supply necessary to remove objectionable body odors under various conditions, as determined experimentally at the Harvard School of Public Health⁴, is given in Table 3.

Outdoor air requirements for the removal of objectionable tobacco smoke odors have yet to be determined. Practical values in the field vary from 5 to 15 cfm per person; this air quantity may and should be a part

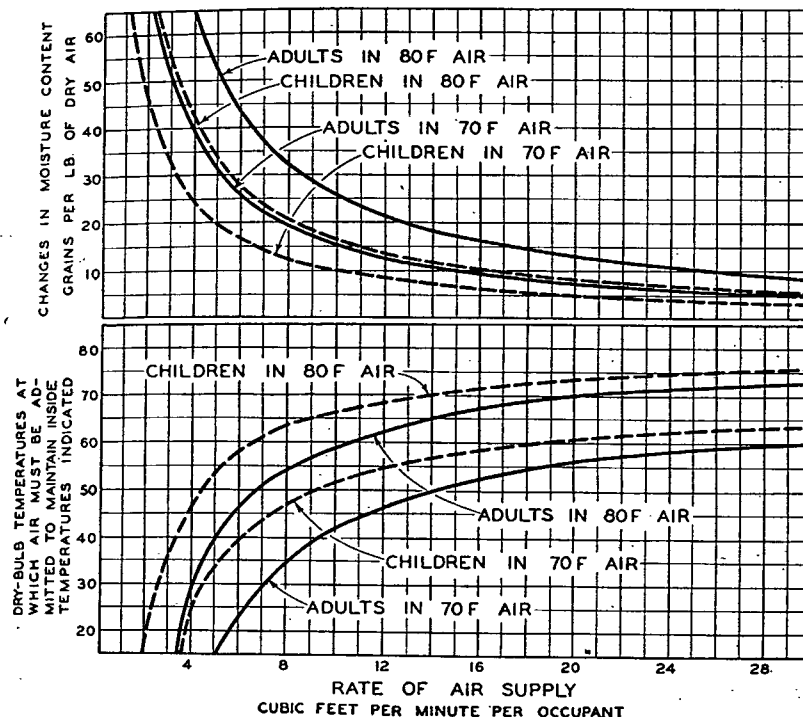


FIG. 7. RELATION AMONG RATE OF AIR CHANGE PER OCCUPANT, MOISTURE CONTENT OF ENCLOSURE, AND DRY-BULB TEMPERATURE OF INCOMING AIR

of that necessary for other requirements, *i.e.*, removal of body odors, heat, moisture, etc.

The total quantity of air to be circulated through an enclosure is governed largely by the needs for controlling temperature and air distribution when either heating or cooling is required. The factors which determine total air quantity include the type and nature of the building, locality, climate, height or rooms, floor area, window area, extent of occupancy, and last but not least, the method of distribution.

Serious difficulties are often encountered in attempting to cool a room

⁴Loc. Cit. Note 3.