



Fresh Air

Freshening the air: One of the most important factors in delivering comfort is the freshness of the conditioned air. If the same air was circulated over and over again it would become 'stale' and make the occupants very uncomfortable. Ideally an airconditioning system would induce plenty of fresh air into the air system. However this outside air brings with it moisture and heat from outside. This causes the heat load on the airconditioning system to go up thereby requiring a larger and consequently more expensive plant.

Substantial research has been done by ASHRAE to determine the optimum requirement of fresh air for different applications and the airconditioning engineer designs the plant accordingly. Usually the fresh air requirements are stipulated as **cubic feet per minute (cfm) per person** or **minimum air changes per hour**. A guide on recommended Fresh Air requirements is given below:

Table 4. Typical Fresh Air Requirements

Application	Smoking	Cfm per person		Fresh air Changes/Hr
		Recommended	Minimum	
Apartments	Some	20	15	1
Stores	None	7.5	5	1
Bars	Heavy	30	25	3
Restaurants	Considerable	15	12	2
Hotel Rooms	Considerable	20	15	2
Conference rooms	Considerable	20	15	3
Theatres	None	7.5	5	3
Banks	Occasional	10	7.5	2
Offices	Some	15	10	1
Computer rooms	None	10	7.5	2
Factories	None	10	7.5	2



In **Hospitals** it is necessary, not only to bring in plenty of fresh air, but to also move the existing air more rapidly through the conditioned space to reduce the risk of infection. The following table indicates the number of **fresh air changes** required and the rate in which the entire air in the system is to be circulated.

Table 5. Fresh Air requirements & Circulation Rates for health care establishments

Type of facility	Fresh air Changes/hour	Circulation Air Changes/hour
Operating theatre	5	25
Recovery room	2	6
ICU	2	6
Delivery room	5	12
Trauma care	5	12

Sick Building syndrome

Airconditioning systems must do more than provide immediate comfort conditions. They must also be designed to prevent hidden negative effects on the occupants over a period of time. Indoor Air Quality (IAQ) is becoming an important concern and one hears the term 'Sick Building Syndrome' (SBS) frequently these days. The effects of IAQ are usually non specific symptoms rather than clearly defined illnesses. Symptoms attributed to IAQ problems include headache, nausea, shortness of breath, sinus congestion, cough and eye-nose & throat irritation. The solution often lies in improvement of the air quality by introducing plenty of fresh clean air into the building and reducing the noise of air-flow and machinery.



Changes in Fresh Air requirement over the years

It is interesting to see how the specified fresh air requirements changed over the years. In 1824 the recommendation was 4 cubic feet per minute (cfm) per person. In 1893 the American Society of Heating Refrigeration and Airconditioning Engineers (ASHRAE) changed the specification to 30 cfm. In 1936 it went down to 10 cfm which was considered the threshold level for detecting human body odours. In the early seventies with the energy crisis forcing the world into fuel economy the figure went way down to 5 cfm. Then in the Eighties the growing concern about indoor air quality prompted the Society to raise the quantity of fresh air to 15 cfm.

Table 6. Changes in specified Fresh Air requirements

Year	Recommendation
1824	☞☞☞☞
1893	☞☞☞☞☞ ☞☞☞☞☞☞ ☞☞☞☞☞ ☞☞☞☞☞☞ ☞☞☞☞☞ ☞☞☞☞☞☞
1936	☞☞☞☞☞ ☞☞☞☞☞
1973	☞☞☞☞☞
1985	☞☞☞☞☞ ☞☞☞☞☞ ☞☞☞☞☞
Where: ☞ = 1 cfm of outside air per person	