Ventilation: British Guides

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1. Introduction

Building legislation for all of England and Wales except London is provided by a set of Building Regulations. At the moment these are designed to ensure the safety and health of the occupants. Building in London is the exception which is controlled by the Greater London Council who have their own rules along similar lines.

This legislation is complemented by at least three sets of national guides. The first is the British Standards Institute who issue Codes of Practice. This describes current good practice. The second, aimed at architects, are the Building Research Station Advisory Papers which succinctly summarise topics of interest. The third is the guide to professional building service engineers, previously called the IHVE Guide but now changing to CIBS.

The ventilation recommendations from each of these sources are now outlined.

2. Building Regulations 1976: Section K

The aim of the ventilation system is to link each room directly to the outside. Unless they are ventilated mechanically, habitable rooms require an openable ventilator of at least one-twentieth of the total floor area provided in the external wall. Some part of this opening must be at least 1.75m above the floor level. Kitchens and bathrooms are not normally habitable although the kitchen is generally considered habitable if it exceeds $9m^2$ floor area.

Larders used for the storage of perishable food must have either a window of at least $85,000mm^2$ openable area or two or more ventilators of at least $4,500mm^2$ unobstructed area. A durable flyscreen must be fitted.

Mechanical ventilation for sanitary conveniences must be capable of discharging three air changes an hour into the external air.

3. Greater London Council Regulations

Public rooms such as theatres or dance halls of $46m^2$ or more must have mechanical ventilation. This will provide $28m^3/h$/person of which at least 21 is fresh air. Where complete air conditioning is provided and can keep the relative humidity below 55% r.h. then the fresh air supply can be reduced to $14m^3/h$/person. Recirculated air will be filtered.

Offices which cannot satisfactorily be ventilated with openable windows will have mechanical ventilation which provides at least $21m^3/h$/person of fresh air or $21m^3/h$/per $5m^2$ of floor area, whichever is the greater. Plant failures are met by either providing ventilators of one-fortieth of the floor area which can be opened by the staff or by providing a stand-by power supply. Fully air conditioned offices capable of maintaining 50-55% r.h. can reduce the fresh air to $14m^3/h$/person with $7m^3/h$/person recirculated air.

4. British Standards Institution: Code of Practice CP3

This guide is being revised.

The new guide is planned to link the recommendations firmly to the known data so that the origin of the recommendations can be clearly identified. Criteria include prevention of condensation on walls, supply of combustion air for boilers, dilution of body odours and absence of annoyance by tobacco smoke. Yaglou's work is used as the basis for the body odour dilution and the elimination of annoyance from tobacco smoke.

Fresh air requirements may be calculated for each building according to its use. An office where each occupant had $15m^3$ of room volume would require 3 litres/s/p ($10.8m^3/p$) to dilute body odours and 8 litres/s/p ($28.8m^3/p$) if the occupants each smoked at the rate of 3 cigarettes/hour.

5. BRE Digest No. 170 Ventilation of internal bathrooms and W.C's in dwellings October 1974

This advises on mechanical ventilation for service rooms without an openable window. The guide proposes the use of air flow not air change rate since air change is so dependent on the room volume. It recommends that mechanical ventilation operates in bathrooms and toilets during occupancy and for a further 20 minutes. At each operation the ventilator should extract at least $20m^3$ of air from the W.C. or the bathroom. If the rooms are combined the air quantity should be $40m^3$ per operation.

6. The Institution of Heating and Ventilating Engineers Guide 1970

This guide accepts Yaglou's odour findings which relate the fresh air needed to personal space (Table 1). Yaglou's results are taken as the minimum values for fresh air. Recommended values for non-smoking areas are 50% higher and for smoking areas 100% higher.

Table 1 Ventilation rates where occupancy is known

Air space/person m^3	Fresh air per person litres/second		
	Minimum	Recommended Minima	
		Non-smoking	Smoking
3	11.3	17.0	22.6
6	7.1	10.7	14.2
9	5.2	7.8	10.4
12	4.0	6.0	8.0

These values are then interpreted for air conditioned spaces, taking account of the likely density of occupation and amount of smoking, as follows:

Table 2 Recommended outdoor air supply rates for air conditioned buildings

Space	Smoking	Outdoor air litres/second		
		Recommended per person	Minimum per person	per m^2 floor
Open plan office	some	8	5	1.3
Private office	heavy	12	8	1.3
Conference room	some	18	12	-
Executive office	very heavy	25	18	6.0

7. Conclusion

Ventilation requirements, their identification, provision and control are now receiving much attention in Britain.