

**VENTILATION OF
BUILDINGS**



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REGULATION 23

Ventilation of buildings

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ASTERISKS

Throughout the Technical Standards an asterisk against a standard denotes that a provision deemed to satisfy the standard or some aspect of the standard is specified at the end of the relevant Part.

ITALICS

Throughout the Technical Standards a term in italics is a defined term. The definition is listed in Part A, General.

Introduction

- 1.** The intention of this Part is to ensure reasonable provision for an adequate supply of air for human occupation of a *building*. Ventilation can be provided by natural means, natural with mechanical assistance or wholly mechanical.
- 2.** The standards apply to all *buildings* covered by the Regulations except to a *building*, or part of a *building*, to which the Factories Act applies. *Buildings* subject to the Factories Act have very diverse ventilation requirements which will be determined by the Factories Inspectorate of the Health and Safety Executive. Those involved in the provision of such a *building* are advised to consult the Inspectorate at an early stage.
- 3.** The ventilation of a *building* can have a significant affect on energy consumption and a thorough assessment of natural as against mechanical ventilation should be made as the decision could significantly affect the energy efficiency of a *building*.
- 4.** Increased standards of insulation and “tighter” *construction of buildings*, which reduces the number of natural air changes, increase the risk of condensation particularly in *dwellings*. The standards of ventilation given for moisture producing areas are the minimum necessary to provide means of combating condensation. The effect of these standards will be determined by design and workmanship both of the ventilation arrangements and the *building* as a whole.
- 5.** There are other requirements for ventilation which will have to be taken into account in certain cases. Part E for example, has requirements for smoke ventilation of *escape routes* in case of fire. Where these would meet the requirements of this Part the provision need not be duplicated. Part F has requirements related to combustion appliances, in particular, where an *open-flued* appliance takes combustion air from within a *dwelling*. These are in addition to, and must be kept separate from, any openings required by this Part. It is therefore particularly important that, as in common with all work requiring building warrant, this Part is read in conjunction with all other Parts and particularly Part F.

Regulation 23

Ventilation of *buildings*

- 23. (1)** A *building* to which this regulation applies shall have means of providing an adequate supply of air for users of the *building*.
- (2) This regulation shall apply to all *buildings* except *buildings* or any part of a *building* to which the Factories Act 1961 (a) applies.
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(a) 1961 c.34

The standards

K1 Application of Part K

- K1.1** This Part sets out the required standards for Regulation 23.
- K1.2** The standards apply to all *buildings* except to a *building*, or part of a *building*, specified in Regulation 23(2).
- K1.3** The volume of any space for ventilation purposes is the internal cubic capacity of the space, **except -**
- a. where the space is for vehicle parking, any volume more than 3 metres above any floor level in that space is to be disregarded; and
 - b. in any other space, any volume more than 6 metres above any floor level in that space is to be disregarded.
- K1.4** Any requirement for an area of opening may be met by a combination of areas.
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K2 Ventilation of *buildings* other than garages

VENTILATION OF *BUILDINGS* OTHER THAN GARAGES

- K2.1*** A *building* other than a garage must have adequate provision for ventilation by natural means, mechanical means, or a combination of natural and mechanical means, **except -**
- a. there is no requirement to ventilate a storage *room* used only for storage requiring a controlled temperature; and
 - b. there is no requirement to ventilate a *room* with a floor area of not more than 4 square metres; and
 - c. a passive stack ventilation system is only permissible in a *building* of *purpose group* 1 with no *storey* at a height of more than 7.5 metres; and
 - d. a *room* where the cubic space per occupant is not more than 3 cubic metres must have mechanical ventilation.

K3 Ventilation of garages

LARGE GARAGES

K3.1* A garage with a floor area greater than 60 square metres for the parking of motor vehicles must have adequate provision for natural or mechanical ventilation on every *storey*.

SMALL GARAGES

K3.2* A garage with a floor area of at least 30 square metres but not more than 60 square metres used for the parking of motor vehicles must have adequate provision for natural or mechanical ventilation.

K4 General ventilation requirements

NATURAL VENTILATION

K4.1* Ventilation must be to the outside air, **except -**

- a. a *ventilator* serving a *room* in a *dwelling* may open into a *conservatory* provided that the ventilation of the *conservatory* is to the outside air and is calculated on the basis of the total floor area of the *room* and the *conservatory*; and
- b. a *trickle ventilator* serving a bathroom or shower-room may open into a bedroom from which it has direct access, provided the bedroom is fitted with a suitable *trickle ventilator*.

K4.2 Some part of the opening part of a *ventilator*, including a *trickle ventilator*, must be at least 1.75 metres above floor level.

K4.3* A passive stack ventilation system must be suitably *constructed* and installed.

K4.4 Each passive stack ventilation system must -

- a. incorporate an automatic humidity sensitive ventilation inlet grille; and
- b. where it passes through a *roof space* or other unheated space or where it extends above roof level, be insulated with at least 25mm thick material having a thermal conductivity of 0.04 W/mK.

K4.5 The *duct* or casing forming a passive stack ventilation system serving a *kitchen* must be *non-combustible* **except -**

where it passes through a *roof space*,

MECHANICAL VENTILATION

- K4.6** Where a mechanical ventilation system serves more than one *dwelling* it must have a duplicate motor and be separate from any other ventilation system installed for any other purpose.
- K4.7** Where a mechanical ventilation system gathers extracts into a common *duct* for discharge to an outlet, no connection to the system is permitted between any exhaust fan and the outlet.
- K4.8** Mechanical ventilation must be to the outside air. It may be via a *duct* or heat exchanger.
- K4.9*** An inlet to, and an outlet from, a mechanical ventilation system must be suitably installed so as to avoid contamination of the air supply to the system.
- K4.10*** A mechanical ventilation system must be *constructed* to ensure, as far as is *reasonably practicable*, the avoidance of contamination by legionella.

Provisions deemed to satisfy the standards

VENTILATION OF *BUILDINGS* OTHER THAN GARAGES

(K2.1) The requirements of K2.1 will be met -

- a.** for a *room* in a *building* other than a *dwelling*, by the provision of a *ventilator* with an opening area of at least 1/30th of the floor area of the *room* it serves; and where the area of the *room* is
 - i. not more than 10 square metres, a *trickle ventilator* with an opening area of at least 4000 mm²; or
 - ii. more than 10 square metres, a *trickle ventilator* with an opening area of at least 400 mm² for each square metre of *room* area; or
- b.** for any *building* with natural ventilation by -
 - i. compliance with Section 3 of BS5925: 1991 (1995); or
 - ii. CIBSE Guide A: 1986, Design data, Section A4, Air infiltration and natural ventilation; or
- c.** for any *building* with mechanical ventilation (there are additional provisions in Part E for mechanical ventilation systems), by -
 - i. compliance with BS5720: 1979; or
 - ii. CIBSE Guide B: 1986, Section B2; or
- d.** for *dwelling*s only, by -
 - i. compliance with the requirements of BRE Digest 398; or
 - ii. the table to this specification -

Table to (K2.1): Ventilation of a *dwelling*

Space	Minimum Ventilation Requirements	Trickle Ventilation (minimum) [Note 1]
<i>Apartment</i>	a <i>ventilator</i> with an opening area of 1/30th of the floor area it serves.	8000 mm ²
<i>Kitchen</i>	either - a. mechanical extraction capable of 30 litres/sec (intermittent) above a hob [Note 2]; b. mechanical extraction capable of 60 litres/sec (intermittent) if elsewhere [Note 2]; or c. a passive stack ventilation system [Notes 3 & 4].	4000 mm ²
<i>Utility room</i>	either - a. mechanical extraction capable of 30 litres/sec (intermittent) [Note 2]; or b. a passive stack ventilation system [Notes 3 & 4].	4000 mm ²
Bathroom or shower-room (with or without a WC).	either - a. mechanical extraction capable of 15 litres/sec (intermittent); or b. a passive stack ventilation system [Note 3].	4000 mm ²
<i>Toilet</i>	either - a. a <i>ventilator</i> with an opening area of 1/30th of the floor area it serves; or b. mechanical extraction capable of 3 air changes per hour.	4000 mm ²

Notes:

1. The overall provision of *trickle ventilation* in a *dwelling* may be provided at an average of 6000 mm² per *room*, with a minimum provision of 4000 mm² in each *apartment*.
2. Refer to Part F where an extract fan is fitted in a *building* containing an open-flued combustion appliance.
3. Refer to Part D where a passive stack ventilation system is installed in a *building* of *purpose sub-group* 1A.
4. The *flue* of an open-flued combustion appliance may serve as a passive stack ventilation system provided that either -
 - a. the appliance is a solid fuel appliance and is the primary source of heating, cooking or hot water production; or
 - b. the *flue* has an unobstructed area equivalent to a 125mm diameter *duct* and the appliance's combustion air inlet and dilution air inlet are permanently open, i.e. there is a path with no control dampers which could block the flow, or the ventilation path can be left open when the appliance is not in use.

LARGE GARAGES

(K3.1) The requirements of K3.1 will be met by a parking garage *constructed* -

- a. in accordance with Section B2 of the CIBSE Guide: 1986, -
 - i. to give carbon monoxide concentrations of not more than 50 parts per million averaged over an eight hour period; and
 - ii. to restrict peak concentrations of carbon monoxide at areas of traffic concentration such as ramps and exits to not more than 100 parts per million for periods not exceeding 15 minutes;

- b. in accordance with Section 4 of the Association for Petroleum and Explosive Administration's "Code of practice for ground floor, multi-storey and underground car parks", and Section B2 of the CIBSE Guide B: 1986;
- c. where the garage is naturally ventilated, by providing openings in the walls on every *storey* of at least 1/20th of the floor area of that *storey* with at least half of such area in opposite walls;
- d. where the garage is mechanically ventilated, by providing a system capable of at least 6 air changes per hour and at least 10 air changes per hour where traffic concentrations occur; or
- e. where there is a combined natural/mechanical ventilation system, by providing -
 - i. openings in the walls on every *storey* of at least 1/40th of the floor area of that *storey* with at least half of such area in opposite walls; and
 - ii. a mechanical system capable of at least 3 air changes per hour.

SMALL GARAGES

(K3.2) The requirements of K3.2 will be met -

- a. where the garage is naturally ventilated, by providing at least 2 *permanent ventilators*, each with an open area of at least 1/3000th of the floor area they serve, positioned to encourage through ventilation with one of the *permanent ventilators* being not more than 600mm above floor level; or
- b. where the garage is mechanically ventilated, by providing a ventilation system -
 - i. capable of continuous operation, designed to provide at least 2 air changes per hour;
 - ii. independent of any other ventilation system; and
 - iii. *constructed* so that two-thirds of the exhaust air is extracted from outlets not more than 600mm above floor level.

NATURAL VENTILATION

(K4.1) The requirements of K4.1b will be met where the *trickle ventilator* fitted in the bedroom complies with the table to (K2.1).

(K4.3) The requirements of K4.3 will be met by a passive stack ventilation system *constructed* and installed fully in accordance with Information Paper BRE IP 13/94.

MECHANICAL VENTILATION

(K4.9) The requirements of K4.9 will be met where the inlet to, and outlet from, the mechanical ventilation system are installed in accordance with Clause 2.3.3 of BS5720: 1979.

(K4.10) The requirements of K4.10 will be met where the ventilation system is *constructed* in accordance with the requirements of paragraphs 70 to 84 of "The control of legionellosis including legionnaires' disease".

