



# **Building Regulations, 1991**

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## **TECHNICAL GUIDANCE DOCUMENT F VENTILATION**

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DEPARTMENT OF THE  
**ENVIRONMENT**

DUBLIN:  
PUBLISHED BY THE STATIONERY OFFICE.

To be purchased through any Bookseller, or directly from the  
GOVERNMENT PUBLICATIONS SALE OFFICE  
SUN ALLIANCE HOUSE, MOLESWORTH STREET, DUBLIN 2.

Price £0.80p

DECEMBER, 1991

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# **BUILDING REGULATIONS, 1991**

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## **TECHNICAL GUIDANCE DOCUMENT F VENTILATION**

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### **INTRODUCTION**

This document has been published by the Minister for the Environment under article 5 of the Building Regulations, 1991, for the purpose of providing guidance with regard to compliance with the requirements of Part F of the First Schedule to the Regulations. Where works are carried out in accordance with this guidance, this will, *prima facie*, indicate compliance with these requirements.

This document should be read in conjunction with the Regulations.

Guidance contained in this document with respect to the use of a particular material, method of construction, standard or other specification does not preclude the use of any other suitable material, method of construction, standard or specification.

### **TECHNICAL SPECIFICATIONS**

Building Regulations are made for specific purposes i.e. health, safety and welfare of persons, energy conservation and the special needs of disabled people. Technical Specifications (including Harmonised European Standards, European Technical Approvals, National Standards and Agrément Certificates) are relevant to the extent that they relate to these considerations. Technical Specifications may also address other aspects of performance not covered by the Regulations.

The references in this document to named Technical Specifications, or to materials and methods which are likely to be suitable for the purposes of the Regulations, are not exclusive and other materials and methods may be suitable in particular circumstances. A reference to a Technical Specification is to the latest edition (including any amendments, supplements or addenda) current at the date of publication of this Technical Guidance Document

### **MATERIALS AND WORKMANSHIP**

Under Part D of the First Schedule to the Regulations, building work must be carried out with proper materials and in a workmanlike manner. Relevant guidance is contained in Technical Guidance Document D.

Part D of the First Schedule to the Regulations defines "proper materials" as materials which are fit for the use for which they are intended and for the conditions in which they are to be used, and includes materials which:

- (a) bear a CE Mark in accordance with the provisions of the Construction Products Directive (89/106/EEC); or
- (b) comply with an appropriate harmonized standard, European technical approval or national technical specification as defined in article 4(2) of the Construction Products Directive (89/106/EEC); or
- (c) comply with an appropriate Irish Standard or Irish Agrément Board Certificate or with an alternative national technical specification of any Member State of the European Community, which provides in use an equivalent level of safety and suitability.

# VENTILATION

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## Building Regulations - The Requirement

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Part F of the First Schedule to the Building Regulations, 1991 provides as follows:-

Means of ventilation.	F1	Adequate means of ventilation shall be provided for people in buildings.
Condensation in roofs.	F2	Adequate provision shall be made to prevent excessive condensation in a roof or in a roof void above an insulated ceiling.

This Technical Guidance Document is divided into two sections.

Section 1 relates to the requirement in F1.

Section 2 relates to the requirement in F2.

# Section 1

## MEANS OF VENTILATION

Means of  
ventilation

F1

Adequate means of ventilation shall be provided for people in buildings.

### GENERAL

1.1 Guidance in relation to ventilation in buildings is contained in:

- (a) BS 5925 : 1991 Code of practice for ventilation principles and designing for natural ventilation. This code contains recommendations for the supply of outside air and the processes by which these recommendations may be fulfilled.
- (b) BS 5720 : 1979 Code of practice for mechanical ventilation and air conditioning in buildings. This code deals with the work involved in the general design, planning, installation, testing and maintenance of mechanical ventilating and air conditioning systems.
- (c) BS 5250 : 1989 Code of practice for control of condensation in buildings. The code deals with causes and effects of condensation and contains recommendations for their control.

1.2 Certain specific types of buildings such as offices, shops, factories, etc. may be subject to specific legislative requirements. The relevant legislation should be consulted.

1.3 The following paragraphs (1.4 to 1.19) give some guidance to good practice in relation to the ventilation of:

- (a) dwellings,
- (b) the spaces within any building containing one or more dwellings which are used in connection with those dwellings (common spaces),
- (c) rooms containing sanitary conveniences (sanitary accommodation), and
- (d) bathrooms (including shower rooms).

The guidance relates only to non-complex buildings of normal design and construction.

1.4 The ventilation system should:

- (a) provide an adequate supply of fresh air for persons using the area,
- (b) achieve occasional rapid ventilation for the dilution of pollutants and of moisture likely to produce condensation in habitable rooms, kitchens and rooms containing sanitary appliances, and
- (c) extract moisture from areas where it is produced in significant quantities (e.g. kitchen and bathroom).

1.5 A ventilation opening in this section can include any means of ventilation (whether it is permanent or closeable) which opens directly to external air, such as the openable parts of a window, a louvre, an airbrick, a progressively openable ventilator, or a wall ventilator but does not include a flue to an open fire. It may include any door which opens directly to external air. Ventilation openings should have a smallest dimension of at least 8 mm other than in a screen, fascia, baffle etc., so as to minimise resistance to the flow of air.

### VENTILATION OF HABITABLE ROOMS

1.6 Habitable rooms mean rooms used for living or sleeping purposes but not a kitchen having a floor area of less than 6.5 m<sup>2</sup>. (See paragraph 1.19 for height of habitable rooms).

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1.7 Provision should be made for:

- (a) background ventilation by a secure permanent opening (or openings) having a total area not less than 6500 mm<sup>2</sup>, e.g. a wall ventilator, located so as to avoid undue draughts; and
- (b) rapid ventilation by one or more ventilation openings having a total area of at least 1/20th of the floor area of the room, e.g. an opening window, and with some part of the ventilation opening at least 1.75 m above the floor level.

1.8 If ventilation is through another room or space or into a court, see paragraphs 1.16 to 1.18.

## VENTILATION OF KITCHENS IN DWELLINGS

1.9 If the kitchen has a floor area of 6.5 m<sup>2</sup> or more, see paragraphs 1.6 to 1.8 (habitable rooms).

1.10 Provision should be made for:

- (a) background ventilation, either:
  - (i) by a secure permanent ventilation opening (or openings) having a total area not less than 6500 mm<sup>2</sup>, e.g. a wall ventilator located so as to avoid undue draughts, or
  - (ii) by mechanical extract ventilation capable of operating continuously at nominally one air-change per hour; and
- (b) rapid ventilation, either:
  - (i) by one or more ventilation openings having a total area of at least 1/10th of the floor area of the kitchen, e.g. an opening window, and with some part of the ventilation opening at least 1.75 m above the floor level, or
  - (ii) by mechanical extract ventilation capable of extracting at a rate of 60 litres per second (or incorporated within a cooker hood and capable of extracting at a rate of 30 litres per

second), which may be operated intermittently for instance during cooking.

## VENTILATION OF COMMON SPACES

1.11 Provision should be made for ventilation by ventilation opening(s) with a total area of at least 1/50th of the floor area of common space or communicating common spaces.

1.12 Where the space is wholly internal, and is used for access only, ventilation can be provided by way of mechanical extract ventilation capable of operating continuously at nominally one airchange per hour.

## VENTILATION OF BATHROOMS

1.13 Provision should be made for ventilation, either:

- (a) by rapid ventilation by one or more ventilation openings having a total area of at least 1/20th of the floor area of the room, e.g. an opening window, and with some part of the ventilation opening at least 1.75 m above the floor level, or
- (b) by mechanical extract ventilation capable of extracting at a rate of 15 litres per second, which may be operated intermittently.

## VENTILATION OF SANITARY ACCOMMODATION

1.14 Sanitary accommodation means a space containing one or more water closets or urinals. Sanitary accommodation containing one or more cubicles counts as a single space if there is free circulation of air throughout the space.



1.15 Provision should be made for rapid ventilation, either:

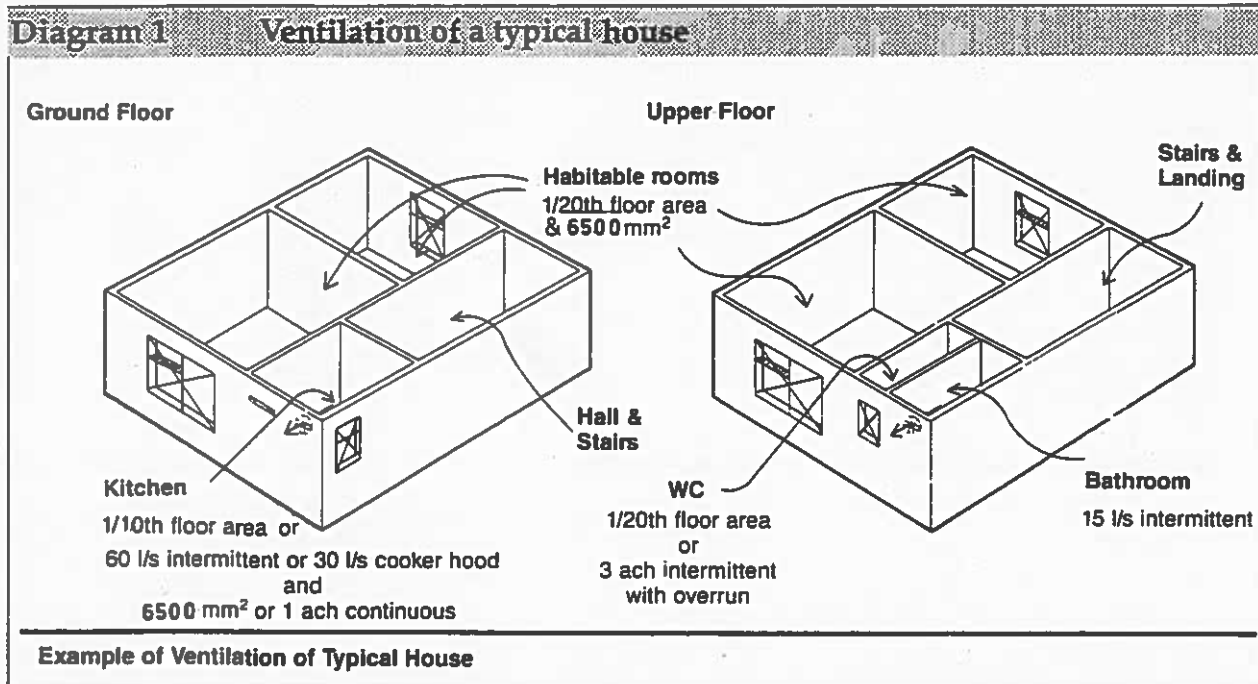
- (a) by one or more ventilation openings having a total area of at least 1/20th of the floor area of the room, e.g. an opening window, and with some part of the ventilation opening at least 1.75 m above the floor level, or
- (b) by mechanical extract ventilation capable of extracting at a rate not less than 3 air-changes per hour, which may be operated intermittently, with 15 minutes overrun.

## VENTILATION OF HABITABLE ROOMS THROUGH OTHER ROOMS AND SPACES

1.16 Two habitable rooms may be treated as a single room for ventilation purposes if there is an area of permanent opening between them equal to at least 1/20th of the combined floor areas.

1.17 A habitable room may be ventilated through an adjoining space if -

- (a) the adjoining space is a conservatory or similar space, and
- (b) there is an opening (which may be closeable) between the room and the space, with an area not less than 1/20th of the combined floor area of the room and space, e.g. an opening window, and with some part of the ventilation opening at least 1.75 m above the floor level, and
- (c) the space has one or more ventilation openings with a total area not less than 1/20th of the combined floor area of the room and space, e.g. an opening window, and with some part of the ventilation opening at least 1.75 m above the floor level, and
- (d) for background ventilation there are permanent ventilation openings to the space and openings between room and space, each having a total area not less than 6500 mm<sup>2</sup>, located so as to avoid undue draughts, and
- (e) the space is not connected to another room.



## VENTILATING TO A COURT

1.18 If a ventilation opening serves a habitable room in a dwelling, the following minimum distances should be maintained:

(a) if there is a wall on each side of the opening (forming a closed court), (see Diagram 2(a)) then the vertical distance from the top of the opening to the top of the wall containing the opening,  $D_t$ , should be less than twice the horizontal distance from the opening of the facing wall,  $D_f$ , or

(b) if there is a wall on only one side of the opening (forming an open court), (see Diagram 2(b)) and if the length of the facing wall,  $D_l$ , is more than twice the horizontal distance from the opening to the facing wall,  $D_f$ , then either -

(i) the vertical distance from the top of the opening to the top of the wall containing the opening,  $D_t$ , or

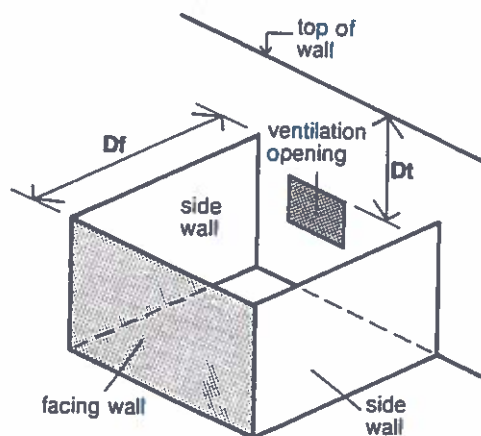
(ii) the horizontal distance from the side of the opening to the open side of the court,  $D_s$ ,

should be less than twice the horizontal distance from the opening to the facing wall,  $D_f$ .

## HEIGHT OF ROOMS

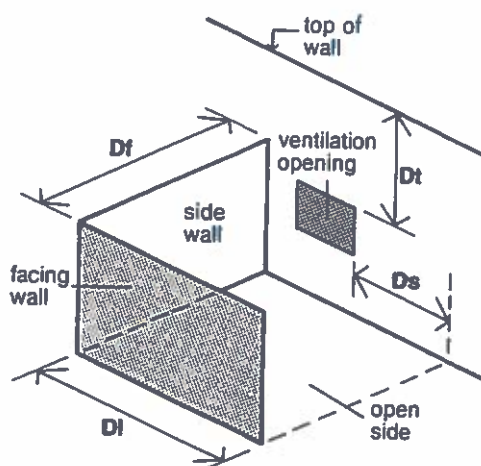
1.19 Every habitable room, kitchen and bathroom should be not less than 2.4 m in height and the height of such room measured beneath any beam in that room and in any bay window shall not be less than 2.1 m. Where such a room is immediately below the roof its height should be not less than 2.4 m over an area equal to not less than one half of the area of the room measured on a plane 1.5m above the finished floor level.

**Diagram 2 Ventilating a habitable room**



$D_t$  should be less than twice  $D_f$

**(a) Closed court**



If  $D_l$  is more than  $2D_f$ ,

$D_t$  should be less than twice  $D_f$

or

$D_s$  should be less than twice  $D_f$

**(b) Open court**

## Section 2

# CONDENSATION IN ROOFS

Condensation  
in roofs

F2

Adequate provision shall be made to prevent excessive condensation in a roof or in a roof void above an insulated ceiling.

### GENERAL

2.1 Guidance in relation to condensation is contained in BS 5250 : 1989 : Code of practice for control of condensation in buildings. The code deals with causes and effects of condensation and contains recommendations for their control. Further detailed guidance is given in the BRE publication 'Thermal Insulation - avoiding Risks'.

2.2 The following paragraphs (2.3 to 2.21) give some guidance to good practice insofar as it relates to non complex buildings of normal design and construction.

2.3 Condensation in a roof and in the spaces above insulated ceilings should be limited so that, under normal conditions

- (a) the thermal performance of the insulating materials, and
- (b) the structural performance of the roof construction

will not be substantially and permanently reduced.

2.4 For the purposes of health and safety, it may not always be necessary to provide ventilation to small roofs such as those over porches and bay windows.

2.5 Roofs where the moisture from the building can permeate the insulation, e.g. cold deck roofs, should be ventilated as in sub-sections 1 and 2.

2.6 Roofs where the moisture from the building cannot permeate the insulation e.g. warm deck roofs or inverted roofs need not be ventilated.

2.7 Guidance is given for pitched roofs in sub-section 1. However, if the ceiling of a room follows the pitch of the roof, ventilation should be provided as if it were a flat roof.

2.8 Guidance is given for flat roofs in sub-section 2.

2.9 Although a part of a roof which has a pitch of 70° or more is to be insulated as though it were a wall, the requirement in F2 applies to roofs of any pitch.

2.10 Ventilation openings may be continuous or distributed along the full length of the eaves and may be fitted with a screen, fascia, baffle, etc.

### Sub-section 1

### ROOFS WITH A PITCH OF 15° OR MORE (PITCHED ROOFS)

2.11 If the ceiling follows the pitch of the roof see sub-section 2.

2.12 Pitched roof spaces should have ventilation openings at eaves level to promote cross-ventilation. These openings should have an area on opposite sides at least equal to continuous ventilation running the full length of the eaves and 10 mm wide (see Diagram 3(a)).

2.13 Purpose-made components are available to ensure that quilt or loose fill insulation will not obstruct the flow of air where the insulation and the roof meet.

2.14 A pitched roof which has a single slope and abuts a wall should have ventilation openings at eaves level and at high level. The ventilation at high level may be arranged at the junction of the roof and the wall or through the roof covering. If it is through the roof covering it should be placed as high as practicable. The area at high level should be at least equal to continuous ventilation running the full length of the junction and 5 mm wide (see Diagram 3(b)).

**Diagram 3**

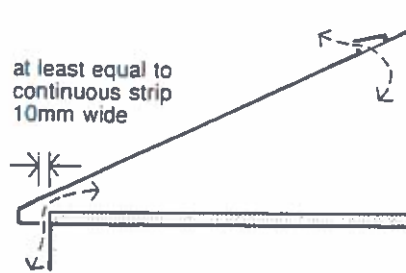
**Ventilating roof voids**

at least equal to  
continuous strip  
10mm wide



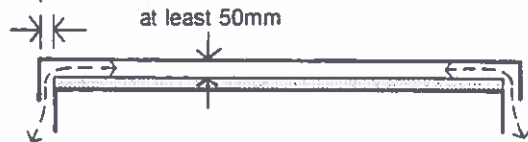
**(a) Pitched roof**

at least equal to  
continuous strip  
10mm wide



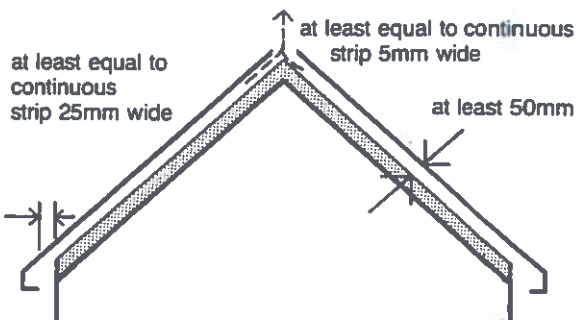
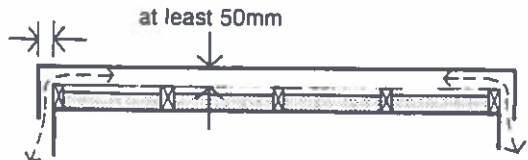
**(b) Lean-to roof**

at least equal  
to continuous  
strip 25mm wide

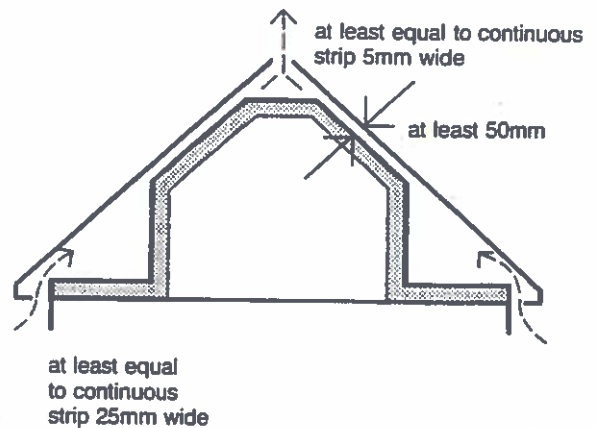


**(c) Flat roof**

at least equal  
to continuous  
strip 25mm wide



**(d) Ceiling following pitch of roof**



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## **Sub-section 2**

### **ROOFS WITH A PITCH OF LESS THAN 15° AND THOSE WHERE THE CEILING FOLLOWS THE PITCH OF THE ROOF**

**2.15** This sub-section also applies to roofs with a pitch of 15° or more if the ceiling follows the pitch of the roof.

**2.16** Roof spaces should have ventilation openings in two opposite sides to promote cross ventilation. These openings should have an area at least equal to continuous ventilation running the full length of the eaves and 25 mm wide (see Diagram 3(c)).

**2.17** Roofs with a span exceeding 10 m or other than a simple rectangle in plan may require more ventilation, totalling 0.6% of the roof area.

**2.18** The void should have a free air space of at least 50 mm between the roof deck and the insulation. Where joists run at right angles to the flow of air a suitable air space may be formed by using counter battens.

**2.19** Pitched roofs, where the insulation follows the pitch of the roof, also need ventilation at the ridge at least equal to continuous ventilation running the length of the ridge and 5 mm wide (see Diagram 3(d)).

**2.20** Where the edges of the roof abut a wall or other obstruction in such a way that free air paths cannot be formed to promote cross ventilation or the movement of air outside any ventilation openings would be restricted, an alternative form of roof construction should be adopted (see paragraph 2.6).

**2.21** Vapour checks can reduce the amount of moisture reaching a void but they cannot be relied on as an alternative to ventilation. A complete barrier to moisture is needed for this.

# Standards and other references

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BS 5250 : 1989 Code of practice for the control of condensation in buildings.

BS 5720 : 1979 Code of practice for mechanical ventilation and air conditioning in buildings.

BS 5925 : 1980 Code of practice for design of buildings : ventilation principles and designing for natural ventilation.

Building Research Establishment "Thermal Insulation - Avoiding Risks".



