

## Approved Document F Volume 1: Dwellings

### Requirement F1: Means of ventilation

The changes take effect from 15 June 2022

A copy of the full document is available at

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1045918/ADF1.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1045918/ADF1.pdf)

This a summary designed to give a quick guide to changes made to the requirements when installing windows and doors in Dwellings. It does not remove the requirement for you to ensure that you are complying with the required legislation and you should always check the full document or, if in any doubt, consult your local building control.

Indicated clause numbering refers to the associate reference point(s) in the Approved Document.

### The new ventilation strategy in this Approved Document

The ventilation strategy in this approved document relies on a combination of all of the following.

1. Extract ventilation from rooms where water vapour or pollutants are likely to be released (e.g. bathrooms and kitchens), to minimise their spread to the rest of the building. Ventilation fans may be either intermittent operation or continuous operation.
2. Whole dwelling ventilation to provide fresh air to the building and to dilute, disperse and remove water vapour and pollutants not removed by extract ventilation.
3. Purge ventilation to remove high concentrations of pollutants and water vapour. Purge ventilation is used intermittently and required only for pollutants produced by occasional activities (e.g. fumes from painting).

Ventilation may be delivered through natural ventilation, mechanical ventilation or a combination of both.

The ventilation systems in this approved document are examples of systems that comply with Part F of the Building Regulations. Other ventilation systems may be acceptable if they can be shown to meet an equal level of performance.

This edition recognises that many existing dwellings are ventilated through infiltration rather than purposeful ventilation. Energy efficiency measures carried out on existing dwellings might reduce infiltration and cause the dwelling to become under-ventilated.

Therefore, any building work should not reduce the ventilation provision of the dwelling unless it can be demonstrated that the ventilation provision after the work is carried out meets the minimum standards of requirement F1(1).

## Types of ventilation referred to in the document

Key terms can be found in Annex A but these are the most common types of ventilator that you may come across.

**Background ventilator:** A small ventilation opening designed to provide controllable whole dwelling ventilation.

**NOTE: A window with a night latch position is NOT adequate for background ventilation, due to the following:**

1. The risk of draughts.
2. Security issues.
3. The difficulty of measuring the equivalent area.

**Continuous mechanical extract ventilation:** Mechanically driven ventilation that continuously extracts indoor air and discharges it to the outside.

**Extract ventilation:** The removal of air directly from an internal space or spaces to the outside. Extract ventilation may be by natural means or by mechanical means (e.g. by an extract fan or a central system).

**Heat recovery:** Applied to mechanical supply and extract systems or a single room ventilator, extract air is passed over a heat exchanger and the recovered heat is put into the supply air.

**Mechanical ventilation with heat recovery:** A mechanically driven ventilation system that both continuously supplies outdoor air to the inside of the dwelling and continuously extracts indoor air and discharges it to the outside. For the purposes of this approved document, the guidance for mechanical ventilation with heat recovery applies to centralised or decentralised supply and extract systems, with or without heat recovery.

**Natural ventilation:** Ventilation provided by thermal, wind or diffusion effects through doors, windows or other intentional openings without the use of mechanically driven equipment. For the purposes of this approved document, natural ventilation refers to a ventilation strategy using background ventilators and intermittent extract ventilation.

## Approved Document F1: Section 3: Work on existing dwellings

When building work in an existing dwelling includes work on ventilation, for example:

- a. adding a habitable room
- b. adding a wet room
- c. replacing part of the ventilation system, including extract fans

the work should meet the relevant standards in this approved document.

When other building work is carried out that will affect the ventilation of the existing dwelling, for example:

- a. replacing a window or door
- b. doing energy efficiency work

the ventilation of the dwelling should either:

- a. meet the standards in the relevant approved document
- b. not be less satisfactory than before the work was carried out.

### NOTE:

1. Ventilation through infiltration should be considered to be part of the ventilation provision of a dwelling. Reducing infiltration might reduce the indoor air quality of the dwelling below the standards given in Appendix B.
2. It is accepted that in replacing windows and doors, even double glazed for similar double glazed, will improve the airtightness of a property and as such what might be considered a “like for like” change will leave the property less satisfactory than before the work was carried out.

## Method to be adopted when installing replacement windows and doors

The Approved Document defines the following approaches when installing windows:

When replacing windows only - **See Section One**

When installing windows where multiple energy measures are/have been installed - **See Section Two**

When installing conservatories – **See Section Three**

## SECTION ONE

### When Replacing windows ONLY

We believe this is by far the most common situation that will be faced and the simplified approach should be adopted.

#### Existing windows with background ventilators

If the existing windows have background ventilators, the replacement windows should include background ventilators. The new background ventilators should comply with both of the following conditions.

1. Not be smaller than the background ventilators in the original window.
2. Be controllable either automatically or by the occupant.

If the size of the background ventilators in the existing window is not known, the ventilator sizes given below may be applied.

#### Existing windows without background ventilators

Replacing the windows is likely to increase the airtightness of the dwelling. If ventilation is not provided via a mechanical ventilation with heat recovery system, then increasing the airtightness of the building may reduce beneficial ventilation in the building. In these circumstances, it is necessary to ensure that the ventilation provision in the dwelling is no worse than it was before the work was carried out. This may be demonstrated in any of the following ways,

1. Incorporating background ventilators in the replacement windows equivalent to the following.
  - i. Habitable rooms – minimum 8000mm<sup>2</sup> equivalent area.
  - ii. Kitchen – minimum 8000mm<sup>2</sup> equivalent area.
  - iii. Bathroom (with or without a toilet) – minimum 4000mm<sup>2</sup> equivalent area.
2. If the dwelling will have continuous mechanical extract ventilation, installing background ventilators in any replacement windows which are not in wet rooms, with a minimum equivalent area of 4000mm<sup>2</sup> in each habitable room
3. Other ventilation provisions, if it can be demonstrated to a building control body that they comply with the requirements of paragraph 3.2.

**NOTE:** If it is not technically feasible to adopt the minimum equivalent areas the background ventilators should have equivalent areas as close to the minimum value as is feasible.

## Our Interpretation

### Existing windows with background ventilators

If the windows you are removing have background ventilators fitted then the replacement windows **must** have background ventilators of equivalent size or larger.

### Existing windows without background ventilators

If the property has a mechanical ventilation with heat recovery system installed then background ventilators (trickle vents) are **not** required.

If the property **does not** have mechanical ventilation with heat recovery system then one of the following applies:

1. Where continuous mechanical extract ventilation is **NOT** provided:

**Habitable rooms**

Background ventilators should be installed that provide a minimum 8000mm<sup>2</sup> equivalent area

**Kitchen**

Background ventilators should be installed that provide a minimum 8000mm<sup>2</sup> equivalent area.

**Bathroom (with or without a toilet)**

Background ventilators should be installed that provide a minimum 4000mm<sup>2</sup> equivalent area.

2. Where continuous mechanical extract ventilation **IS** provided:

**Habitable rooms**

Background ventilators should be installed that provide a minimum 4000mm<sup>2</sup> equivalent area

**Kitchen**

Not required

**Bathroom (with or without a toilet)**

Not required

**Note:** There is a third option but we believe that it will be difficult to prove and that is to be able to demonstrate that there are other ventilation provisions that would meet the requirements. This would have to be agreed with a Building Control Body and is likely to carry additional fees. If you wish to use this route then we would advise that you contact your building Control Body at the start of your project.

## SECTION TWO

### Method to be adopted when there are multiple energy efficiency measures

Many properties are now being encouraged to have multiple energy efficiency measures installed. This may all be carried out at the same time or could be installed at different times. Where multiple energy efficiency measures are already installed or are part of the same improvement, the following methodology for assessing ventilation requirement of the property should be adopted.

When carrying out energy efficiency measures to an existing dwelling, an assessment should determine what, if any, additional ventilation provision is needed, based on the estimated impact of the work. The assessment should be carried out by one of the following means.

- a. Applying the simplified method in paragraphs **3.8** to **3.13**.
- b. Seeking expert advice, which may include carrying out an air permeability test that follows the procedures given in Approved Document L, Volume 1: Dwellings.

**NOTE:** Following **BSI PAS 2035** is considered to be an adequate means of demonstrating compliance with paragraph 3.6.

**Table 3.1** should be used to calculate the number of major and minor energy efficiency measures involved. This calculation should include all of the following:

- a. Energy efficiency measures fitted since the original dwelling was constructed, to consider accumulation of measures.
- b. Energy efficiency measures planned.

**NOTE:** Where specific energy efficiency measures are not included in Table 3.1, the most similar category should be chosen instead.

**Table 3.1** should then be used to determine the category that the works result in.

<b>Table 3.1 Energy efficiency measures</b>	
<b>Roof insulation</b>	
a) Renewing loft insulation, including effective edge sealing at junctions and penetrations	Minor
b) Loft conversions or works that include changing a cold loft (insulation at ceiling level) to a warm loft (insulation at roof level)	Minor
<b>Wall insulation</b>	
c) Installing cavity wall insulation to any external wall	Minor
d) Installing external or internal wall insulation to less than or equal to 50% of the external wall area	Minor
e) Installing external or internal wall insulation to more than 50% of the external wall area	Major
<b>Replacement of windows and doors<sup>(1)</sup></b>	
f) Replacing less than or equal to 30% of the total existing windows or door units	Minor
g) Replacing more than 30% of the total existing windows or door units	Major
<b>Draught-proofing (other than openings)<sup>(2)</sup></b>	
h) Replacing a loft hatch with a sealed/insulated unit	Minor
i) Sealing around structural or service penetrations through walls, floors or ceiling/roof	Minor
j) Sealing and/or insulating a suspended ground floor	Major
k) Removing chimney or providing another means of sealing over chimney, internally or externally	Major
<b>NOTES:</b>	
1. If the energy efficiency works involve only replacing windows, then the guidance in paragraphs 3.14 to 3.16 may be followed as an alternative means of demonstrating compliance.	
2. Draught-proofing measures might not, on their own, constitute building work. This work may be controllable under the Building Regulations if carried out as part of other building work.	

		Number of minor measures					
		0	1	2	3	4	5
Number of major measures	0	Category A					
	1	Category B					
	2	Category B				Category C	
	3	Category C			Category C		
	4	Category C					

## Examples of how this would impact on properties:

The document describes the measure as “Replacing less than or equal to 30% of the total existing windows or door units”. Since it is the use of “or” rather than “and”, we have taken this to mean that they are considered to be two separate measures. The following examples are based on this understanding.

### Property A

Is a terraced property where the windows and doors are being replaced AND external wall insulation is being applied to the front face only. This represents three measures in total. In this case the external wall insulation would be classed as 1 Minor.

There are two doors, one front and one rear and 6 windows, 2 front and 4 rear, giving a total of 6 window units and 2 door units.

Total units (windows/doors)	No of windows replaced	No of doors replaced	%	Class	Category
2	0	1	50% Door + <50% external wall	1 Major + 1 Minor	B
2	0	2	100% Door + <50% external wall	1 Major + 1 Minor	B
6	1	0	16.6% Window + <50% external wall	2 Minor	A
6	2	0	33.3% Window + <50% external wall	1 Major + 1 Minor	B
6	6	0	100% Window + <50% external wall	1 Major + 1 Minor	B
6 + 2	3	1	50% of Door + 50% Window + <50% external wall	2 Major + 1 Minor	B
6 + 2	2	1	50% door + 33.3% window + <50% external wall	2 Major + 1 Minor	B

## Property B

Is a terraced property where the windows and doors are being replaced AND internal wall insulation is being applied to all external wall areas. This represent three measures in total. In this case the internal wall insulation would be classed as 1 Major.

There are two doors, one front and one rear and 6 windows, 2 front and 4 rear, giving a total of 6 window units and 2 door units.

Total units (windows/doors)	No of windows replaced	No of doors replaced	%	Class	Category
2	0	1	50% Door + >50% internal wall	2 Major	B
2	0	2	100% Door + >50% internal wall	2 Major	B
6	1	0	16.6% Window + >50% internal wall	1 Minor + 1 Major	B
6	2	0	30% Window + >50% internal wall	2 Major	B
6	6	0	100% Window + >50% internal wall	2 Major	B
6 + 2	3	1	50% of Door + 50% Window + >50% internal wall	3 Major	B
6 + 2	2	1	50% Door + 33.3% Window + >50% internal wall	3 Major	B

## Property C

Is a semi-detached property where the windows and doors are being replaced AND external wall insulation is being applied to the front face only. This represent three measures in total. In this case the external wall insulation would be classed as 1 Minor.

There are three doors, one front and two rear (one of which is French doors) and 6 windows, 3 front and 3 rear, giving a total of 6 window units and 3 door units.

Total units (windows/doors)	No of windows replaced	No of doors replaced	%	Class	Category
3	0	1	50% Door + <50% external wall	1 Major + 1 Minor	B
3	0	2	100% Door + <50% external wall	1 Major + 1 Minor	B
6	1	0	16.6% Window + <50% external wall	2 Minor	A
6	2	0	33.3% Window + <50% external wall	1 Major + 1 Minor	B
6	6	0	100% Window + <50% external wall	1 Major + 1 Minor	B
6 + 3	3	1	50% of Door + 50% Window + <50% external wall	2 Major + 1 Minor	B
6 + 3	2	1	50% door + 33.3% window + <50% external wall	2 Major + 1 Minor	B

## Property D

Is a semi-detached property where the windows and doors are being replaced AND external wall insulation is being applied to the front, side and rear faces. This represent three measures in total. In this case the external wall insulation would be classed as 1 Major.

There are three doors, one front and two rear (one of which is French doors) and 6 windows, 3 front and 3 rear, giving a total of 6 window units and 3 door units.

Total units (windows/doors)	No of windows replaced	No of doors replaced	%	Class	Category
3	0	1	50% Door + >50% external wall	12Major	B
3	0	2	100% Door + >50% external wall	2 Major	B
6	1	0	16.6% Window + >50% external wall	1 Minor + 1 Major	B
6	2	0	33.3% Window + >50% external wall	2Major	B
6	6	0	100% Window + >50% external wall	2 Major	B
6 + 3	3	1	50% of Door + 50% Window + >50% external wall	3 Major	B
6 + 3	2	1	50% door + 33.3% window + >50% external wall	3 Major	B

## Property E

Is a detached property where the windows and doors are being replaced AND external wall insulation is being applied to the front face only. This represent three measures in total. In this case the external wall insulation would be classed as 1 Minor.

There are four doors, one front and three rear two of which are patio doors, and 7 windows, 4 front and 3 rear, giving a total of 7 window units and 4 door units.

Total units (windows/doors)	No of windows replaced	No of doors replaced	%	Class	Category
4	0	1	25% Door + <50% external wall	2 Minor	A
4	0	2	50% Door + <50% external wall	1 Major + 1 Minor	B
7	1	0	14.3% Window + <50% external wall	2 Minor	A
7	2	0	28.6% Window + <50% external wall	2 Minor	A
2	4	0	57% Window + <50% external wall	1 Major + 1 minor	B
7 + 4	3	1	25% of Door + 42.9% Window + <50% external wall	2 Minor + 1 Major	B
7 + 4	2	1	25% door + 28.6% window + <50% external wall	3 Minor	A

## Property F

Is a detached property where the windows and doors are being replaced AND external wall insulation is being applied to the all external faces. This represent three measures in total. In this case the external wall insulation would be classed as 1 Minor.

There are four doors, one front and three rear two of which are patio doors, and 7 windows, 4 front and 3 rear, giving a total of 7 window units and 4 door units.

Total units (windows/doors)	No of windows replaced	No of doors replaced	%	Class	Category
4	0	1	25% Door + >50% external wall	1 Minor + 1 Major	B
4	0	2	50% Door + >50% external wall	2 Major	B
7	1	0	14.3% Window + >50% external wall	1 Minor + 1 Major	B
7	2	0	28.6% Window + >50% external wall	1 Minor + 1 Major	B
2	4	0	57% Window + >50% external wall	2 Major	B
7 + 4	3	1	25% of Door + 42.9% Window + >50% external wall	1 Minor + 2 Major	B
7 + 4	2	1	25% door + 28.6% window + >50% external wall	2 Minor+ 1 Major	B

## Interpretation of results

For results that identify **Category A** no further ventilation provision is needed. If the existing windows have background ventilators fitted then they should be fitted to the new windows but if there are no background ventilators fitted in the existing frames then this would imply that none are required in the replacements.

**NOTE:** This only applies where multiple EEM have been installed and final clarification from the Government department has been requested.

For results that fall into **Category B** it is likely that the ventilation provision of the dwelling has been reduced below the requirements of F1(1). Further ventilation provision should be provided by one of the following means:

- a. Natural ventilation, by following the system-specific guidance in paragraphs **1.47** to **1.59**. It is assumed that any existing purpose-built ventilators are in working order and that the equivalent area has not been compromised.
- b. Continuous mechanical extract ventilation, by following the system-specific guidance in paragraphs **1.60** to **1.66**.
- c. Mechanical ventilation with heat recovery, by following the system-specific guidance in paragraphs **1.67** to **1.73**. To avoid unintended air pathways, existing background ventilators should be covered or sealed shut.

## Option a) Natural Ventilation

- 1.47 Intermittent extract fans should be fitted in all wet rooms. For kitchens, utility rooms, bathrooms and sanitary accommodation, the extract rates in Table 1.1 can be met using an intermittent extract fan.
- 1.48 If a wet room has no external walls, the intermittent extract fan should extract at four air changes per hour to meet the purge ventilation standards in paragraphs 1.26 to 1.31.
- 1.49 For sanitary accommodation, extract rates can be met using windows by following the purge ventilation guidance in paragraphs 1.26 to 1.31.
- 1.50 Any automatic controls (e.g. humidity control) for intermittent extract should have a manual override to allow the occupant to turn the extract ventilation on or off.
- 1.51 In a room with no openable window, an intermittent extract fan should be provided with controls which continue to operate the fan for at least 15 minutes after the room is vacated.

## Use of background ventilators

- 1.52 **All rooms with external walls should have background ventilators.** If a habitable room has no external walls, paragraphs 1.42 to 1.44 should be followed.
- 1.53 If the dwelling has more than one exposed façade, the area of background ventilators on each façade should be similar, to allow cross-ventilation.
- 1.54 If an exposed façade is close to an area of sustained and loud noise (e.g. a main road), then a noise attenuating background ventilator should be fitted.
- 1.55 If fans and background ventilators are fitted in the same room, they should be at least 500mm apart.
- 1.56 The minimum total area of background ventilators in each room should follow the guidance in **Table 1.7**.
- 1.57 The total number of ventilators installed in the dwelling's habitable rooms and kitchens should be at least the following.
  - 1. Four ventilators if the dwelling has one bedroom.
  - 2. Five ventilators if the dwelling has more than one bedroom.
- 1.58 If the dwelling has a kitchen and living room which are not separate rooms, at least three ventilators of the same area as for other habitable rooms in **Table 1.7** should be provided in the open-plan space.

## Purge Ventilation

- 1.59 For **purge ventilation**, follow paragraphs 1.26 to 1.31.

## SECTION THREE

### CONSERVATORIES

Additional requirements for conservatories have been added to the Approved Document. As with other legislation relating to conservatories Approved Document F1 is only applicable to conservatories with floor area that exceeds 30m<sup>2</sup>

**Conservatories with a floor area that does not exceed 30m<sup>2</sup> are exempt from the Part F requirements.**

If you are adding a conservatory that has a floor area that exceeds 30m<sup>2</sup> to a property then the following are the specification for ventilation.

#### Addition of a conservatory to an existing building

**3.22** The general ventilation rate for a new conservatory and, if necessary, adjoining rooms could be achieved using background ventilators. The guidance in paragraphs **1.42** to **1.44** should be followed regardless of the ventilation provisions in the existing room adjacent to the conservatory.

#### Ventilation of a habitable room through another room

- 1.42** If a habitable room does not contain windows that can be opened (e.g. an internal room), the requirement to provide adequate ventilation can be met using paragraphs 1.43 and 1.44. This guidance can be used if the room is ventilated through either of the following.
- Another habitable room.
  - A conservatory.
- 1.43** The habitable room or conservatory should have openings to the outside to provide both of the following.
- Purge ventilation with a minimum total area given in paragraph 1.29, based on the combined floor area of the habitable rooms (or the habitable room and the conservatory).
  - Background ventilation of at least 10,000mm<sup>2</sup> equivalent area.
- 1.44** Between the two rooms there should be a permanent opening with a minimum area of 1/20 of the combined floor area of the two rooms (see Diagram 1.3).

**For purge ventilation in a new conservatory, paragraphs 1.26 to 1.31 should be followed.**

- 1.26** A system for purge ventilation should be provided in each habitable room.
- 1.27** Purge ventilation should be capable of extracting at least four air changes per hour per room directly to the outside.
- NOTE:** In order to demonstrate compliance with Part O of the Building Regulations it is likely that higher purge ventilation rates than those given in paragraph 1.29 will be required.
- 1.28** Purge ventilation should be delivered through one of the following means.
- Openings (e.g. windows or doors).
  - A mechanical extract ventilation system.

- 1.29** Where purge ventilation is delivered through openings in a habitable room, the minimum opening areas in Table 1.4 should be achieved. The values in Table 1.4 are based on BS 5925, which assumes all of the following.
- Single-sided ventilation.
  - An urban environment.
  - A wind speed of 2.1 metres per second (m/s).
  - A temperature difference of 3°C between the air inside and outside the building.

- 1.30** Depending on the dwelling design or the external climate, it may be possible in certain circumstances to achieve four air changes per hour with smaller openings. If smaller openings than those given in Table 1.4 are specified, expert advice should be sought to ensure that the design complies with requirement F1(1).

**Table 1.4 Purge ventilation openings**

Opening type	Minimum total area of opening
Hinged or pivot windows with an opening angle of 15 to 30 degrees	1/10 of the floor area of the room
Hinged or pivot windows with an opening angle of greater than or Equal to 30 degrees	1/20 of the floor area of the room
Opening sash windows	
External doors	

- 1.31** Hinged or pivot windows with an opening angle of less than 15 degrees are not suitable for purge ventilation.

## Additional requirements for a new conservatory

Performance testing should follow paragraph **1.32** and controls should follow paragraphs **1.33** to **1.37**.

- 1.32** The air flow resistance of all components should be considered when specifying ventilation systems. The complete assembly, as installed, should be designed to meet the performance standards of this approved document. The performance of the separate components should be measured according to the relevant parts of BS EN 13141 and other relevant standards. The relevant test standards for common equipment types are given in Table 1.5.
- 1.33** Ventilation should be controllable. Controls may be either manual (i.e. operated by the occupant) or automatic.
- 1.34** Background ventilators should be at least 1700mm above floor level, to reduce cold draughts, but still be easy for the occupant to reach. NOTE: Background ventilators are intended to normally be left open.
- 1.35** Continuously running fans should be set up to operate without occupant intervention but may have manual or automatic controls for selecting the high rate of operation. Any manual high rate controls should be provided locally to the spaces being served, e.g. bathrooms and kitchens. Automatic controls might include sensors for humidity, occupancy/usage and pollutant release.

**1.36** Controls based on humidity sensors may be installed in moisture-generating rooms (e.g. kitchen or bathroom) but should not be used for sanitary accommodation, where odour is the main pollutant.

**1.37** Other types of automatic controls might be suitable. Where present, automatic controls should operate according to the need for ventilation in the space. Background ventilators with automatic controls should also have manual override.

**NOTE:** Where a combustion appliance is installed, any automatic controls must also ensure that the ventilation provided meets the requirements of Part J of the Building Regulations.

## GENERAL

Appendix C of the Approved document provides a template for a completion checklist and commissioning sheet.