

Legislation for Domestic Retrofit Ventilation



Agenda

- Why do we need to ventilate
- Building Regulations (Part F & L)
 - Part L1 Requirements
 - Compliance
 - Energy Efficiency Measures
 - Ventilation Systems
 - System Guidance
- Summary and questions

About Us



Company Locations

National Ventilation is a proud UK manufacturer, with facilities in Burrowbridge and Reading where we carry out plastic extrusion, moulding and assembly.



Why do we need Ventilation in our Homes?

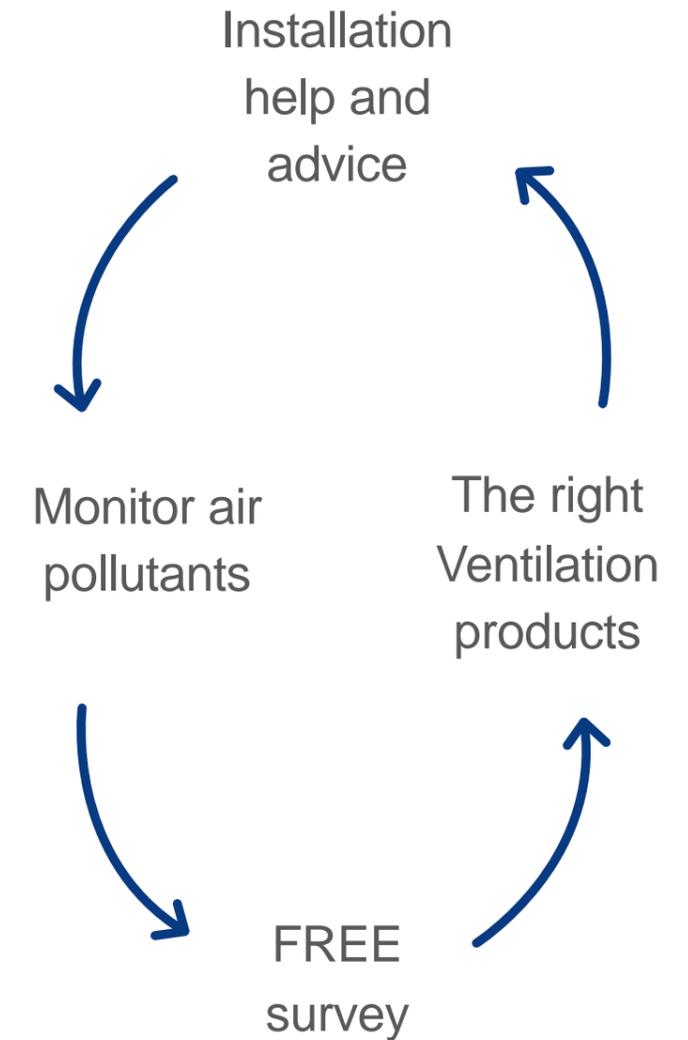
Facts

- 90% of our lives are spend indoors
- Indoor air can be 5x more polluted than outdoor air
- We breathe 9000 litres of indoor air each day

Causes

- Drying washing indoors adds to moisture build up and mould growth
- New furniture releases chemicals, carpets harbour dirt and pet hair causes allergies
- Mould forms in the bathroom caused by excess moisture build up
- Wood burning stoves release particles into the air that you can breath in
- Paints and aerosols release VOC's (Volatile Organic Compounds) in the air
- Cooking with gas releases chemicals into the air. Cooking in general generates excess moisture leading to mould growth

Solutions



Moisture Generation

Condensation - Forms in your home providing ideal conditions for mould to grow

- Make sure ventilation units are working and running
- Close the bathroom door so the humid air can't migrate to other areas of the house
- Clean up spillages straight away
- Insulation, walls and ceilings
- Use pot lids when cooking, this will also save energy!
- Always vent tumble dryers to the outside or use a condensing tumble dryer
- Avoid drying clothing indoors

Mould - Can attach itself to all these areas of your home

- Damp areas, kitchens, bathrooms and wet rooms
- Behind furniture inc cupboards, sofas, beds
- Curtains, windows and windowsills
- Clothing and areas where washing is dried
- 15 litres of moisture per day for the average family when spending 90% of time indoors during the cooler months of the year
- Plants and vegetation

What are the Causes of Mould?

Moisture often builds up around the home.

Lack of air movement means this moisture can condense on surfaces and lead on to more serious issues like mould growth.

The presence of mould and other similar compounds are common triggers for the onset of asthma and other forms of respiratory disease.



How can we Reduce Humidity Levels and Pollutants?

Three elements have to be in place:

- Adequate Heating
 - Air is like a sponge - the warmer it is the more moisture it will hold
- Adequate Insulation
 - Prevents cold surfaces for moisture to condense
- Adequate Ventilation
 - Removes excess moisture and internal pollutants, provides oxygen for the occupants to live and breathe

Building Regulations

HM Government

The Building Regulations 2010

Ventilation

F

APPROVED DOCUMENT

Volume 1: Dwellings
Requirement F1: Means of ventilation
Regulations: 39, 42 and 44

2021 edition – for use in England

HM Government

The Building Regulations 2010

Approved Document **F**

Volume 1 - Dwellings

Ventilation

2022 edition - For use in Wales*

HM Government

The Building Regulations 2010

Conservation of fuel and power

L

APPROVED DOCUMENT

Volume 1: Dwellings
Requirement L1: Conservation of fuel and power
Requirement L2: Onsite generation of electricity
Regulations: 6, 22, 23, 24, 25, 25A, 25B, 26, 26A, 26C, 27, 27A, 27C, 28, 40, 40A, 43, 44 and 44ZA

2021 edition – for use in England

HM Government

The Building Regulations 2010

Approved Document **L**

Volume 1 - Dwellings

Conservation of fuel and power

2022 edition - For use in Wales*

United Kingdom Overview

England

- Published 15 December 2021.

Scotland

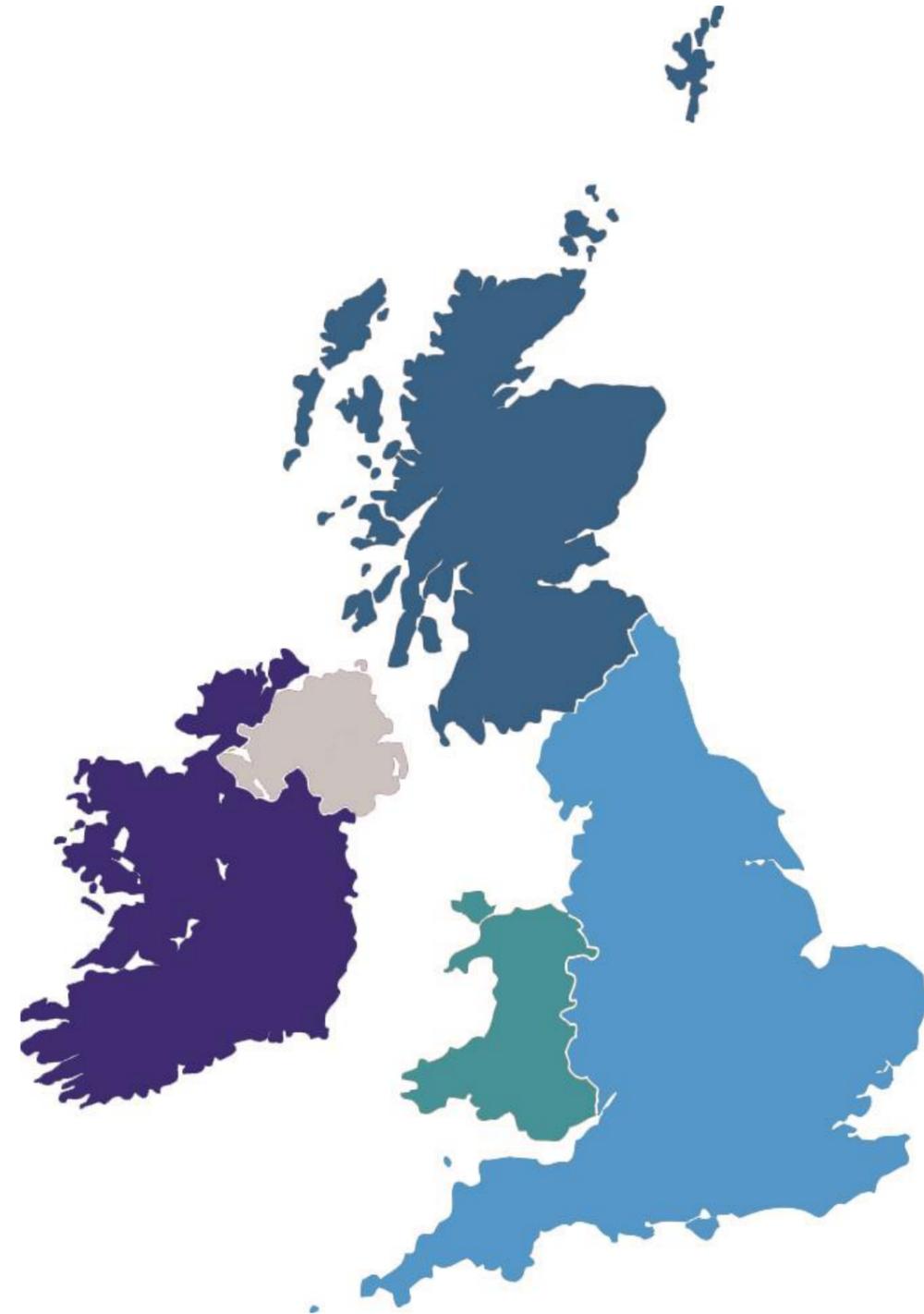
- Published 15 June 2022

Wales

- Published 24th May 2022

Northern Ireland

- Consultation closed 19 December 2021, we expect a finalised document to be published very soon



Transitional Period

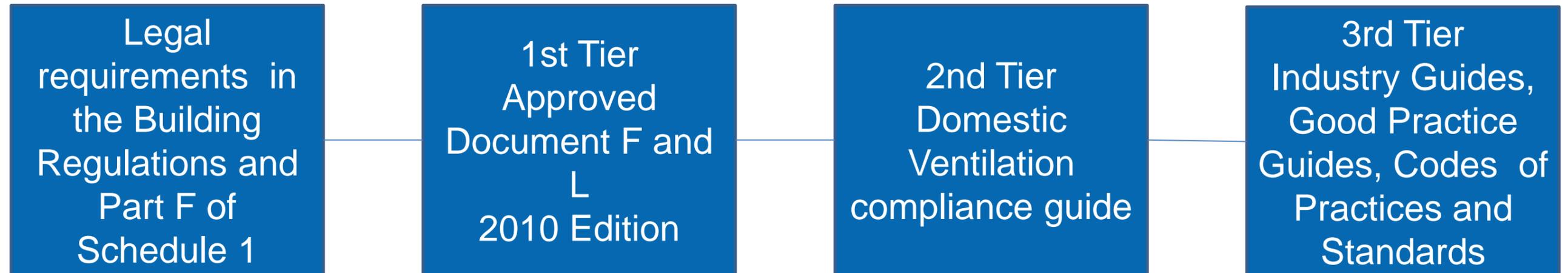
This approved document takes effect on:

- 15th June 2022 for use in England
- 23rd November 2022 for use in Wales

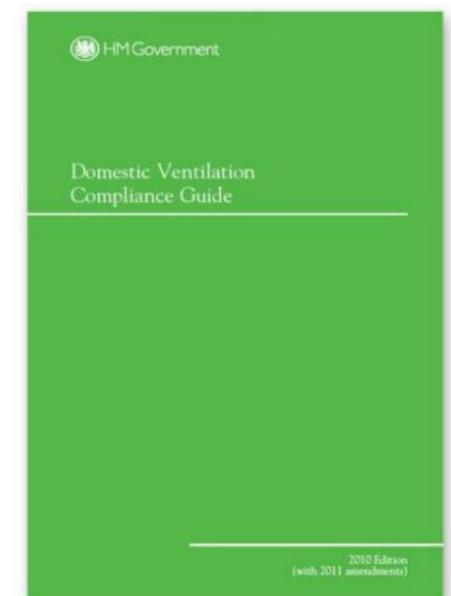
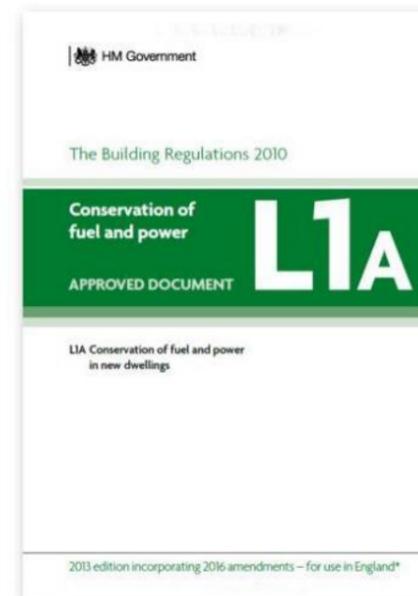
It does not apply to work subject to a building notice, full plans application or initial notice submitted before that date, provided the work is started on site before June 2023 (Wales November 2023).



Part F & L 2010



Both Approved Document F and L refer to additional guides in the form of 2nd and 3rd tier documents.



Part F & L 2010 – 2021 Version

Legal requirements in the Building Regulations and Part F of Schedule 1

Approved Document F and L 2021 Edition

Industry Guides, Good Practice Guides, Codes of Practices and Standards

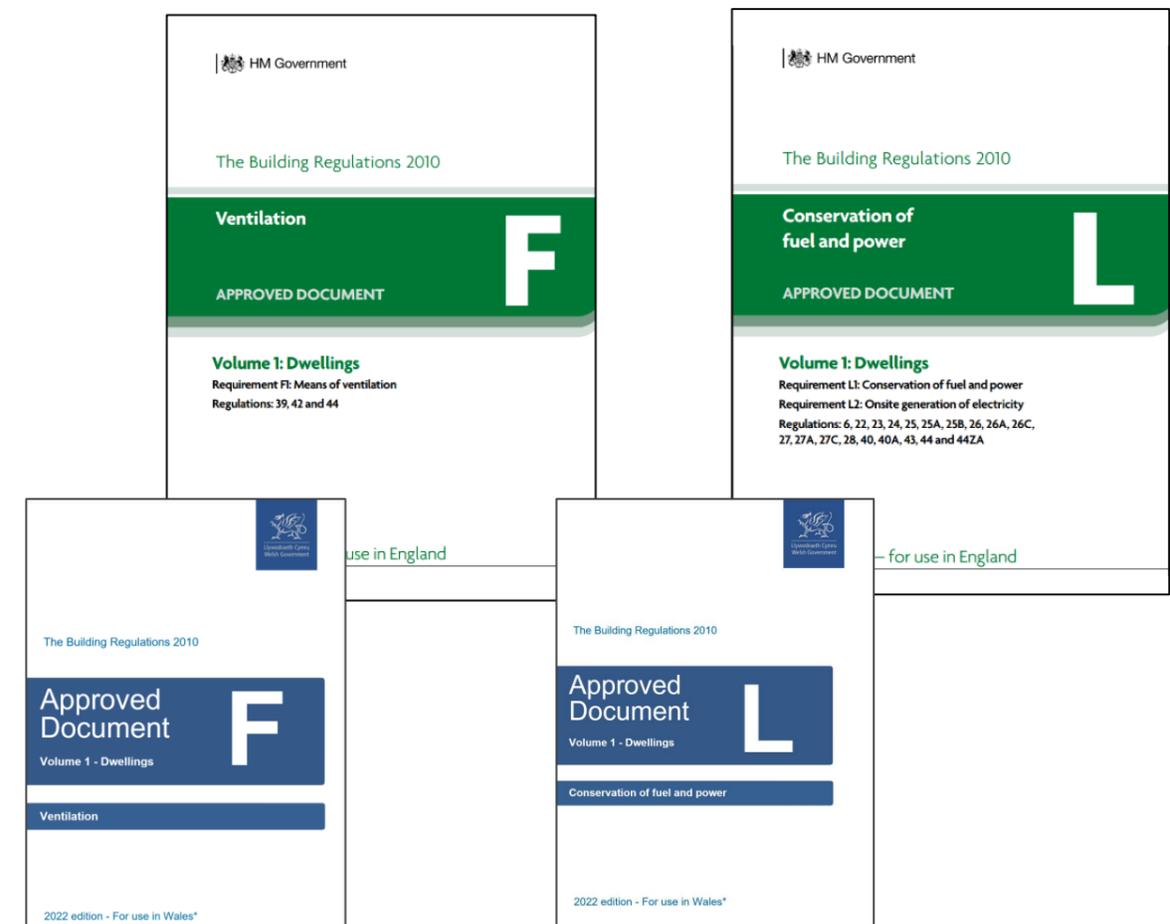
England Published 15th December 2021

Wales Published 24th May 2022

Approved Document F and L now incorporates the Domestic Ventilation Compliance Guide.

Covers both New Build and Refurbishment

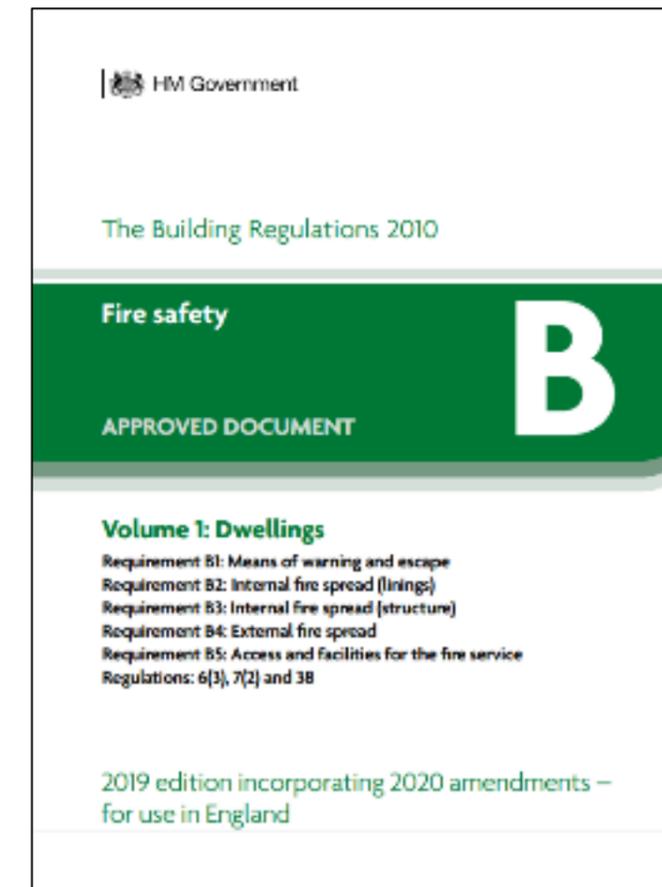
Introduces Part O for Overheating



Interaction with other Approved Documents

Part B – Fire Safety

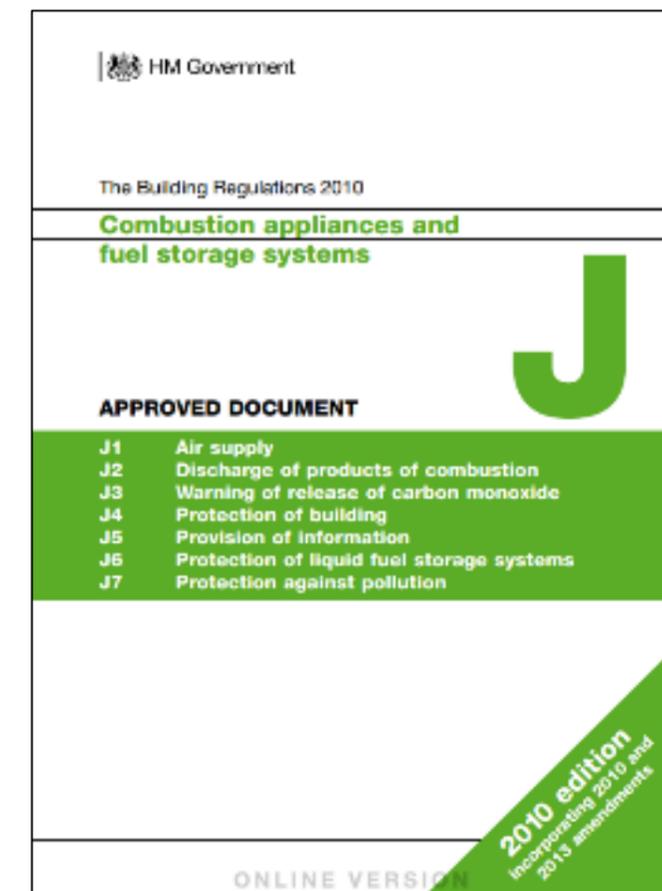
- The requirements of Part B apply if, for example, ducts pass through any of the following:
 - A fire resisting structure
 - A fire compartment
 - A protected stairway
- Approved document F gives guidance on window openings for ventilation. In addition, Approved Document B gives guidance on the size of escape windows. The larger of the window openings specified in Approved Document B or Approved Document F should be applied in all cases.



Interaction with other Approved Documents

Part J – Combustion appliances and fuel storage systems

- Ventilation fans might cause combustion gases to spill from open-flued appliances. These combustion gases might fill the room instead of going up the flue or chimney, even if the combustion appliance and fan are in separate rooms.
- The guidance in Approved Document J should be followed when installing and testing ventilation appliances. Combustion appliances must operate safely whether or not fans are running.

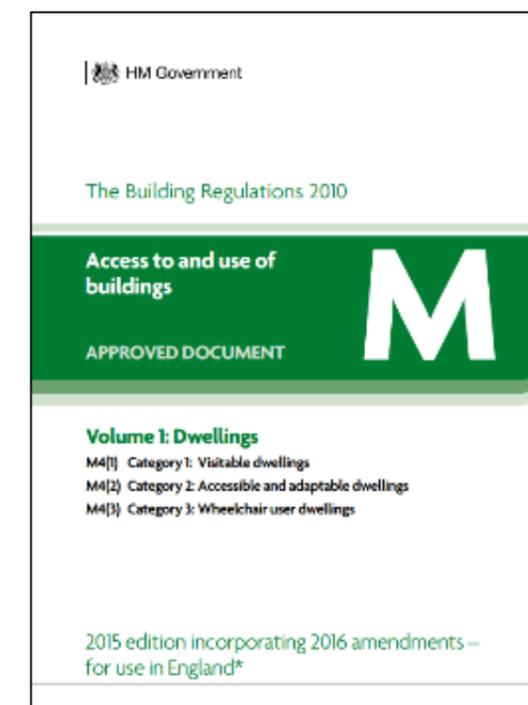


Interaction with other Approved Documents

Part K – Protection from falling, collision and impact

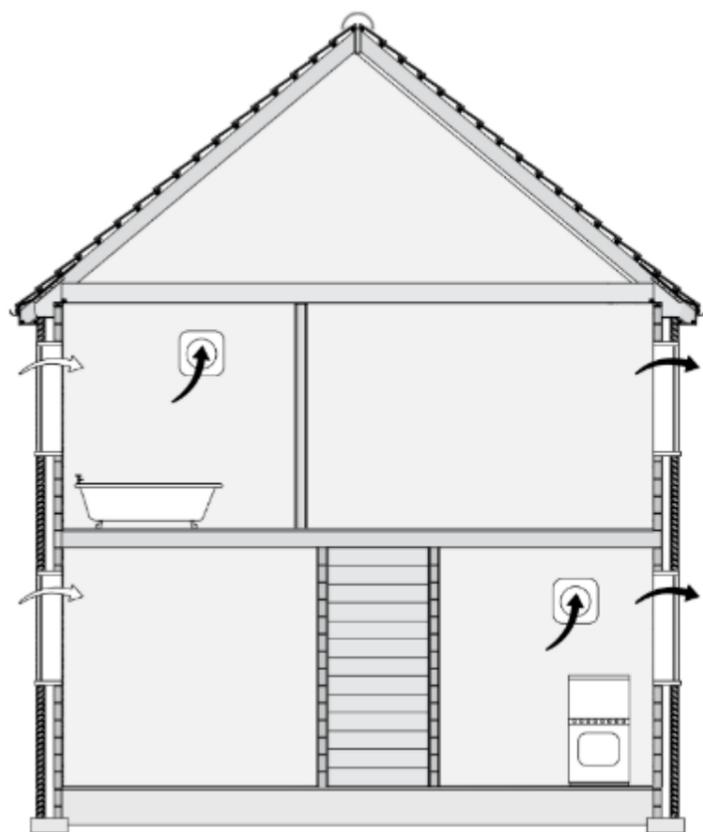
Part M – Access to and use of buildings

- Manual controls - where provided for a ventilation device, these should be within reasonable reach of the occupants.

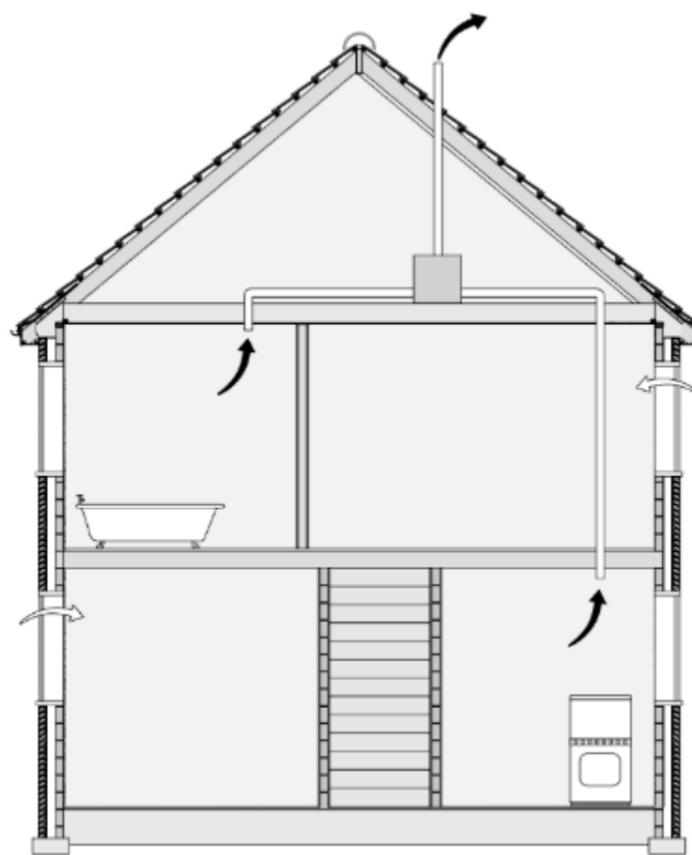


Ventilation Systems

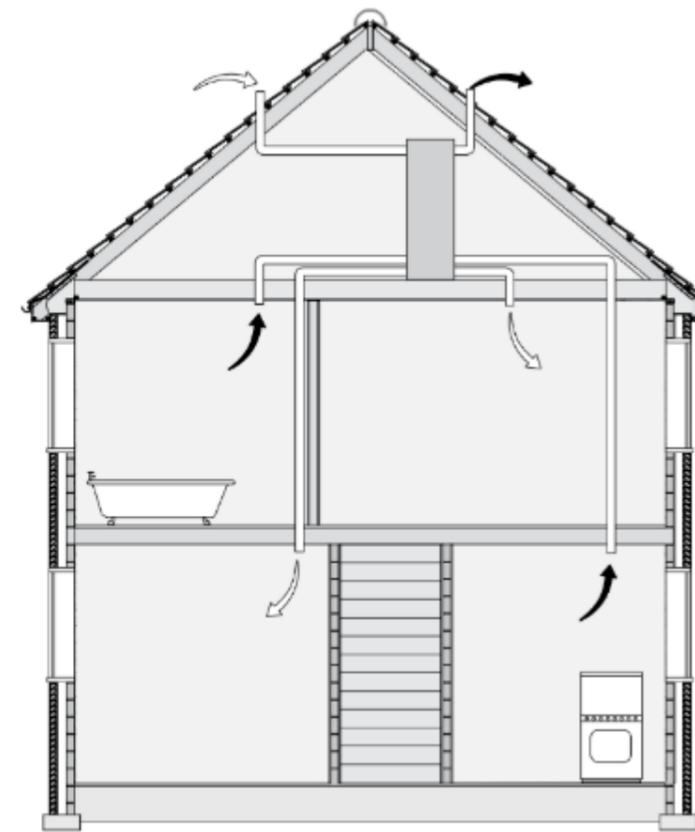
Part F Ventilation Systems



Natural ventilation



Continuous mechanical extract



Mechanical ventilation with heat recovery

Table 1.6 Types of ventilation system

System type	Dwellings covered by the guidance
Natural ventilation (paragraphs 1.47 to 1.59)	Less airtight dwellings
Continuous mechanical extract ventilation (paragraphs 1.60 to 1.66)	All dwellings
Mechanical ventilation with heat recovery (paragraphs 1.67 to 1.73)	All dwellings

Design Performance

2013 Edition

2021 Edition

Table 5.1a Extract ventilation rates

Room	Intermittent extract	Continuous extract	Minimum low rate
	Minimum rate	Minimum high rate	
Kitchen	30 l/s adjacent to hob; or 60 l/s elsewhere	13 l/s	Total extract rate should be at least the whole dwelling ventilation rate given in Table 5.1b
Utility room	30 l/s	8 l/s	
Bathroom	15 l/s	8 l/s	
Sanitary accommodation	6 l/s	6 l/s	

Table 1.1 Minimum extract ventilation rates for intermittent extract systems

Room	Intermittent extract rate (l/s)
Kitchen (cooker hood extracting to the outside) ⁽¹⁾	30
Kitchen (no cooker hood or cooker hood does not extract to the outside) ⁽²⁾	60
Utility room	30
Bathroom	15
Sanitary accommodation ⁽³⁾	6

NOTES:

1. See Diagram 1.1.
2. See Diagram 1.2.
3. As an alternative for sanitary accommodation, the purge ventilation guidance may be used.

Table 1.2 Minimum extract ventilation rates for continuous extract systems⁽¹⁾

Room	High rate (l/s)	Continuous rate
Kitchen	13	The sum of all extract ventilation in the dwelling on its continuous rate should be at least the whole dwelling ventilation rate given in Table 1.3
Utility room	8	
Bathroom	8	
Sanitary accommodation	6	

NOTE:

1. If the continuous rate of ventilation provided in a room is equal to or higher than the minimum high rate specified in the table, no extra ventilation is needed.

Design Performance

Table 1.3 - Minimum whole dwelling ventilation rates determined by the number of bedrooms

Number of bedrooms	2013 Edition	2021 Edition	Increase
1	13 l/s	19 l/s	46 %
2	17 l/s	25 l/s	47 %
3	21 l/s	31 l/s	47 %
4	25 l/s	37 l/s	48 %
5	29 l/s	43 l/s	48 %

The minimum whole dwelling ventilation rate for the supply air should meet the higher of the two following results:

- A minimum rate of 0.3 l/s per m² of internal floor area
- A minimum rate determined by the number of bedrooms, as per Table 1.3.

NOTES:

1. If the dwelling only has one habitable room, a minimum ventilation rate of 13l/s should be used.
2. For each additional bedroom, add 6l/s to the values in Table 1.3.

Part L1 – Interaction with Part F

As per Part L

- Care should always be taken to reduced unwanted heat losses through air infiltration
- The air infiltration of a dwelling needs to be considered as per ADF
- Maximum specific fan power (SFP) given for different system types in Watts

	Building Services Compliance Guide for domestic and non-domestic (2013 Edition)	Part L1 (2021 Edition)
Natural ventilation with background ventilators and intermittent extract fans	0.5 W/l/s	0.5 W/l/s
Continuous Mechanical Extract Ventilation systems	0.7 W/l/s	0.7 W/l/s
Continuous supply systems	0.5 W/l/s	0.5 W/l/s
Continues mechanical supply and extract ventilation systems	1.5 W/l/s	1.5 W/l/s
Heat recovery efficiency	70%	73%

All supply and extract ventilation systems within the same unit should be fitted with all the following:

- A heat recovery system with a minimum efficiency of 73%
- A summer bypass facility (giving the ability to bypass the heat exchanger or to control its heat recovery performance)
- A variable speed controller

Work on Existing Buildings

When work involves:

- a. Building an extension
- b. Adding a wet room
- c. Replacing part of the ventilation system

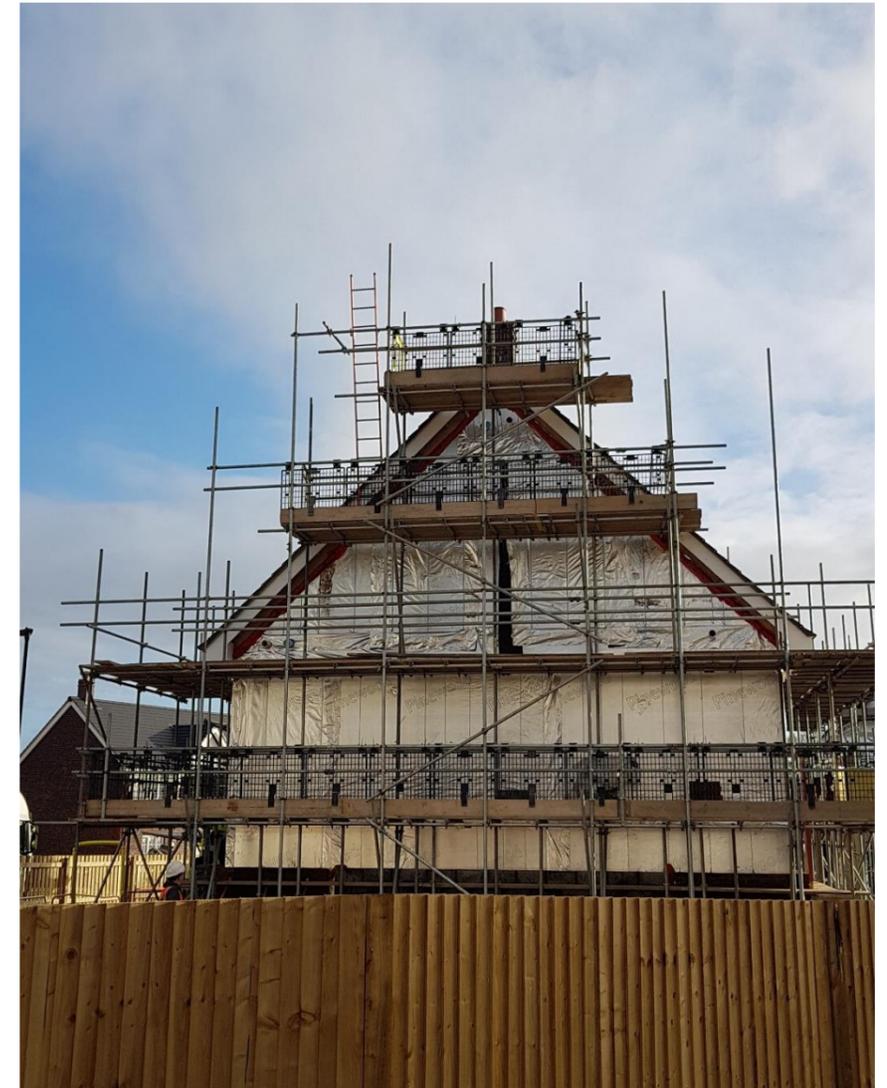
The work should meet the relevant standards in this approved document

When work involves the following:

- a. Replacing windows or doors
- b. Doing energy efficiency work

It must either:

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



Energy Efficiency Measures

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.

To combat this, when installing energy efficiency measures which may make the fabric of the building more airtight you are now required to perform an assessment of the ventilation provision after the work is carried out.

There are 2 methods for doing this:

1. Apply the simplified method
2. Seeking expert advice

Note: BSI PAS 2035 is considered acceptable to demonstrate compliance with paragraph 3.6.

Energy Efficiency Measures

Table 3.1 Energy efficiency measures

	Category of measure
Roof insulation	
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
Wall insulation	
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
Replacement of windows and doors⁽¹⁾	
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
Draught-proofing (other than openings)⁽²⁾	
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

NOTES:

- 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.
- 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.

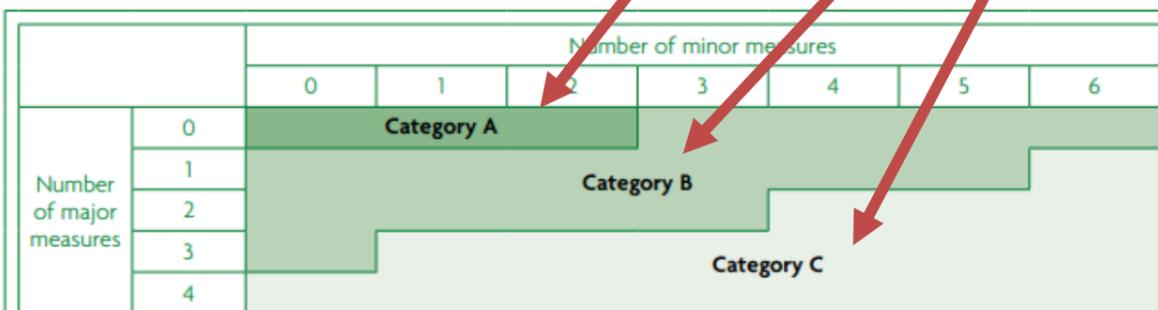


Diagram 3.1 Chart for categorising impact on ventilation when carrying out works in existing dwellings

Simplified method

Category A:

No further ventilation provision is required.

Category B or C:

Further ventilation should be provided via:

- Natural Ventilation (following expert advice for design, sizing and position of background ventilators if category C)
- Continuous mechanical extract ventilation
- Mechanical ventilation with heat recovery

Appendix D

Table D1 Checklist for ventilation provision in existing dwellings

Natural ventilation ⁽¹⁾		
What is the total equivalent area of background ventilators currently in dwelling?		mm ²
Does each habitable room satisfy the minimum equivalent area standards in Table 1.7 ⁽²⁾ ?	Yes	No
Have all background ventilators been left in the open position?	Yes	No
Are fans and background ventilators in the same room at least 0.5m apart?	Yes	No
Are there working intermittent extract fans in all wet rooms?	Yes	No
Is there the correct number of intermittent extract fans to satisfy the standards in Table 1.1?	Yes	No
Does the location of fans satisfy the standards in paragraph 1.20?	Yes	No
Do all automatic controls have a manual override?	Yes	No
Does each room have a system for purge ventilation (e.g. windows)?	Yes	No
Do the openings in the rooms satisfy the minimum opening area standards in Table 1.4?	Yes	No
Do all internal doors have sufficient undercut to allow air transfer between rooms as detailed in paragraph 1.25 (i.e. 10mm above the floor finish or 20mm above the floor surface)?	Yes	No
Continuous mechanical extract ventilation ⁽¹⁾		
Does the system have a central extract fan, individual room extract fans, or both?	Yes	No
Does the total combined continuous rate of mechanical extract ventilation satisfy the standards in Table 1.3?	Yes	No
Does each minimum mechanical extract ventilation high rate satisfy the standards in Table 1.2?	Yes	No
Is it certain that there are <i>no</i> background ventilators in wet rooms?	Yes	No
Do all habitable rooms have a minimum equivalent area of 5000mm ² ?	Yes	No
Does each room have a system for purge ventilation (e.g. windows)?	Yes	No
Do the openings in the rooms satisfy the minimum opening area standards in Table 1.4?	Yes	No
Do all internal doors have sufficient undercut to allow air transfer between rooms as detailed in paragraph 1.25 (i.e. 10mm above the floor finish or 20mm above the floor surface)?	Yes	No
Mechanical ventilation with heat recovery ⁽¹⁾		
Does each habitable room have mechanical supply ventilation?	Yes	No
Does the total continuous rate of mechanical ventilation with heat recovery satisfy the standards in Table 1.3?	Yes	No
Does each minimum mechanical extract ventilation high rate satisfy the standards in Table 1.2?	Yes	No
Have all background ventilators been removed or sealed shut?	Yes	No
Does each room have a system for purge ventilation (e.g. windows)?	Yes	No
Do the openings in the rooms satisfy the minimum opening area standards in Table 1.4?	Yes	No
Do all internal doors have sufficient undercut to allow air transfer between rooms as detailed in paragraph 1.25 (i.e. 10mm above the floor finish or 20mm above the floor surface)?	Yes	No
NOTES:		
1. Make a visual check for mould or condensation. If either are present, install additional ventilation provisions or seek specialist advice.		
2. All references to tables and paragraphs are to Approved Document F, Volume 1: Dwellings.		

Replacing Windows

Windows with existing trickle vents:

- New trickle vents must be not smaller than the existing ones
- Must be controllable automatically or via occupant

Windows without existing background vents:

Replacing a window will likely increase the airtightness of the building, reducing ventilation. Therefore, it is necessary to either:

A) Incorporate background vents in the replacement windows to the following:

1. Habitable rooms – Min 8000mm²
2. Kitchen - Min 8000mm²
3. Bathroom – Min 4000mm²

B) 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 4000mm² in each habitable room.

C) Other ventilation provision demonstrated compliant to the BCB



Additional Habitable Room (Excluding Conservatories)

Requirement for adequate ventilation can be met if:

- a) The additional room is connected to an existing habitable room which now has no windows opening to the outside
- b) The additional room is connected to an existing habitable room that still has windows opening to the outside, the following conditions apply:
 - i. If the existing habitable room has a total background ventilator equivalent area of less than 5,000mm²
 - ii. If the existing habitable room has a total background ventilator equivalent area of at least 5,000mm²
 - Background ventilators of at least 12,000mm² equivalent area between the two rooms
 - Background ventilators of at least 12,000mm² equivalent area between the additional room and the outside

Additional Habitable Room (Excluding Conservatories)

An alternative to the previous method of demonstrating adequate ventilation is a single room heat recovery ventilator (SRHRV).

The supply rate required can be calculated as per the below:

$$\frac{(\text{whole dwelling ventilation rate} \times \text{Room volume})}{(\text{Total volume of all habitable rooms})}$$

Alternatively still, if there is a mechanical ventilation system already installed, this could be extended into the room.

Purge requirements from paragraphs 1.26 to 1.31 must also be observed.

Addition of a Conservatory

Conservatories with a floor area of 30m² or below are exempt from the Part F requirements.

The ventilation rate for a new conservatory could be achieved via background ventilators as per the guidance in 1.42 to 1.44 (referenced later in the presentation). This should be followed regardless of ventilation provisions in existing adjacent rooms.

Purge requirements from paragraphs 1.26 to 1.31 (referenced later in this presentation) must also be observed.



Addition of a Wet Room

When a wet room is added, the whole dwelling ventilation should be extended, and extract ventilation provided via one of the following:

- Intermittent extract with a background ventilator of at least 5000mm²
- Continuous extract
- Single Room Heat Recovery (SRHRV)

SRHRV must use the high speed from table 1.2, minimum intermittent extract rates, for the room that has been added for its high rate and 50% of this value as the continuous rate.

In this case, background trickle vents are not required.

A door undercut of 10mm above finished floor or 20mm above unfinished floor is required for air transfer.

Purge ventilation is required (referenced later in the presentation)

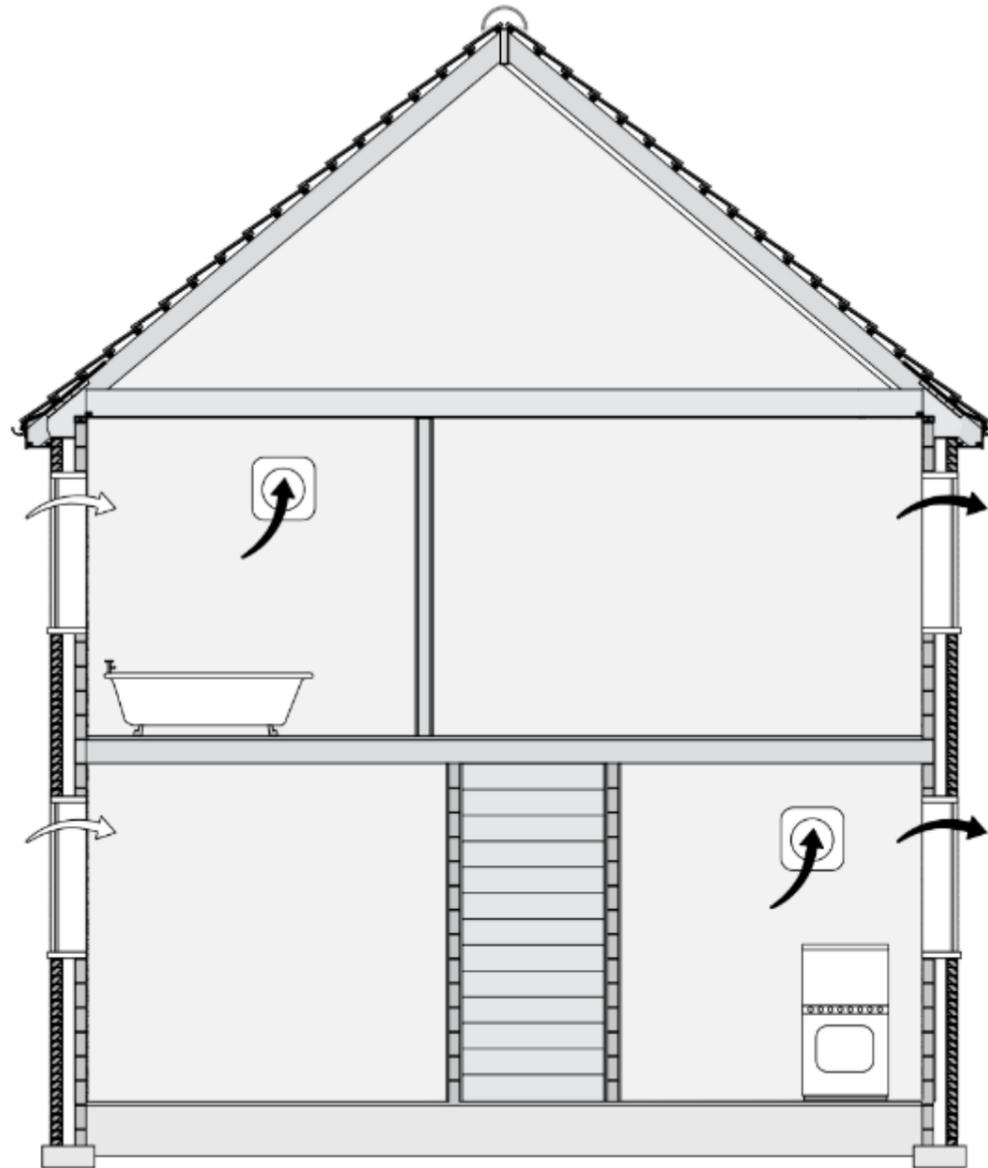
Refurbishing a Kitchen or Bathroom

Where building work is carried out in a kitchen or bathroom, any existing fans (including cooker hoods, where they extract to the outside) should be retained or replaced.

If there is no ventilation system in the original room, it is not necessary to provide one in the refurbished room. However, additional ventilation may be necessary if it makes it less compliant.

If an extractor fan or cooker hood is replaced and it uses the existing cabling, this does not need to be notified to a building control body

Natural Ventilation with Background Ventilators and Intermittent Extract Fans



(guidance suitable only for less airtight dwellings)

Natural Ventilation with Background Ventilators and Intermittent Extract Fans



Intermittent fans and
background ventilators

Intermittent Extract Design Performance

Table 5.1a Extract ventilation rates

Room	Intermittent extract
	Minimum rate
Kitchen	30 l/s adjacent to hob; or 60 l/s elsewhere
Utility room	30 l/s
Bathroom	15 l/s
Sanitary accommodation	6 l/s

2013 Edition

Table 1.1 Minimum extract ventilation rates for intermittent extract systems

Room	Intermittent extract rate (l/s)
Kitchen (cooker hood extracting to the outside) ⁽¹⁾	30
Kitchen (no cooker hood or cooker hood does not extract to the outside) ⁽²⁾	60
Utility room	30
Bathroom	15
Sanitary accommodation ⁽³⁾	6

NOTES:

1. See Diagram 1.1.
2. See Diagram 1.2.
3. As an alternative for sanitary accommodation, the purge ventilation guidance may be used.

2021 Edition

If a wet room has no external wall, the fan should extract at 4 air changes per hour to meet the purge ventilation standards

Any automatic control i.e. humidity control should have a manual override to allow the extract ventilation to be turned on or off

If there is no window, the fan should be provided with controls which continue to operate for at least 15 minutes after the room is vacated.

Intermittent Extract Background Ventilators

2013 Edition

A – Total equivalent ventilator area ^a (mm ²) for a dwelling with any design air permeability.					
Total floor area (m ²)	Number of bedrooms ^b				
	1	2	3	4	5
≤50	35000	40000	50000	60000	65000
51–60	35000	40000	50000	60000	65000
61–70	45000	45000	50000	60000	65000
71–80	50000	50000	50000	60000	65000
81–90	55000	60000	60000	60000	65000
91–100	65000	65000	65000	65000	65000
> 100	Add 7000 mm ² for every additional 10 m ² floor area				

B – Alternative guidance on total equivalent ventilator area ^a (mm ²) for a dwelling with a designed air permeability leakier than (>) 5 m ³ /(h.m ²) at 50 Pa.					
Total floor area (m ²)	Number of bedrooms ^b				
	1	2	3	4	5
≤50	25000	35000	45000	45000	55000
51–60	25000	30000	40000	45000	55000
61–70	30000	30000	30000	45000	55000
71–80	35000	35000	35000	45000	55000
81–90	40000	40000	40000	45000	55000
91–100	45000	45000	45000	45000	55000
> 100	Add 5000 mm ² for every additional 10 m ² floor area				

Notes:
a. The **equivalent area** of a **background ventilator** should be determined at 1 Pa pressure difference, using the appropriate test method given in Table 5.3.
b. This is based on two occupants in the main bedroom and a single occupant in all other bedrooms. For a greater level of occupancy, assume a greater number of bedrooms (i.e. assume an extra bedroom per additional person). For more than five bedrooms, add an additional 10000 mm² per bedroom.

2021 Edition – enlarged on next slide

Table 1.7 Minimum equivalent area of background ventilators for natural ventilation⁽¹⁾

Room	Minimum equivalent area of background ventilators for dwellings with multiple floors	Minimum equivalent area of background ventilators for single-storey dwellings
Habitable rooms ⁽²⁾⁽³⁾	8000mm ²	10,000mm ²
Kitchen ⁽²⁾⁽³⁾	8000mm ²	10,000mm ²
Utility room	No minimum	No minimum
Bathroom ⁽⁴⁾	4000mm ²	4000mm ²
Sanitary accommodation	No minimum	No minimum

NOTES:

- The use of this table is not appropriate in any of the following situations and expert advice should be sought.
 - If the dwelling has only one exposed façade.
 - If the dwelling has at least 70% of its openings on the same façade.
 - If a kitchen has no windows or external façade through which a ventilator can be installed.
- Where a kitchen and living room accommodation are not separate rooms (i.e. open plan), no fewer than three ventilators of the same equivalent area as for other habitable rooms should be provided within the open-plan space.
- The total number of ventilators installed in a dwelling's habitable rooms and kitchens should be no fewer than five, except in one-bedroom properties, where there should be no fewer than four.
- If a bathroom has no window or external façade through which a ventilator can be installed, the minimum equivalent area specified should be added to the ventilator sizes specified in other rooms.

- Rooms with external walls should have background ventilators
 - Night latch position windows are not an adequate alternative
- If a dwelling has more than one external façade, background ventilators should be equal on each façade to allow cross flow
 - Attenuating ventilators should be fitted if external noise is an issue
- Fans and background ventilators should be at least 500mm apart if installed in the same room

Intermittent Extract Background Ventilators

Table 1.7 Minimum equivalent area of background ventilators for natural ventilation⁽¹⁾

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Kitchen ⁽²⁾⁽³⁾	8000mm ²	10,000mm ²
Utility room	No minimum	No minimum
Bathroom ⁽⁴⁾	4000mm ²	4000mm ²
Sanitary accommodation	No minimum	No minimum

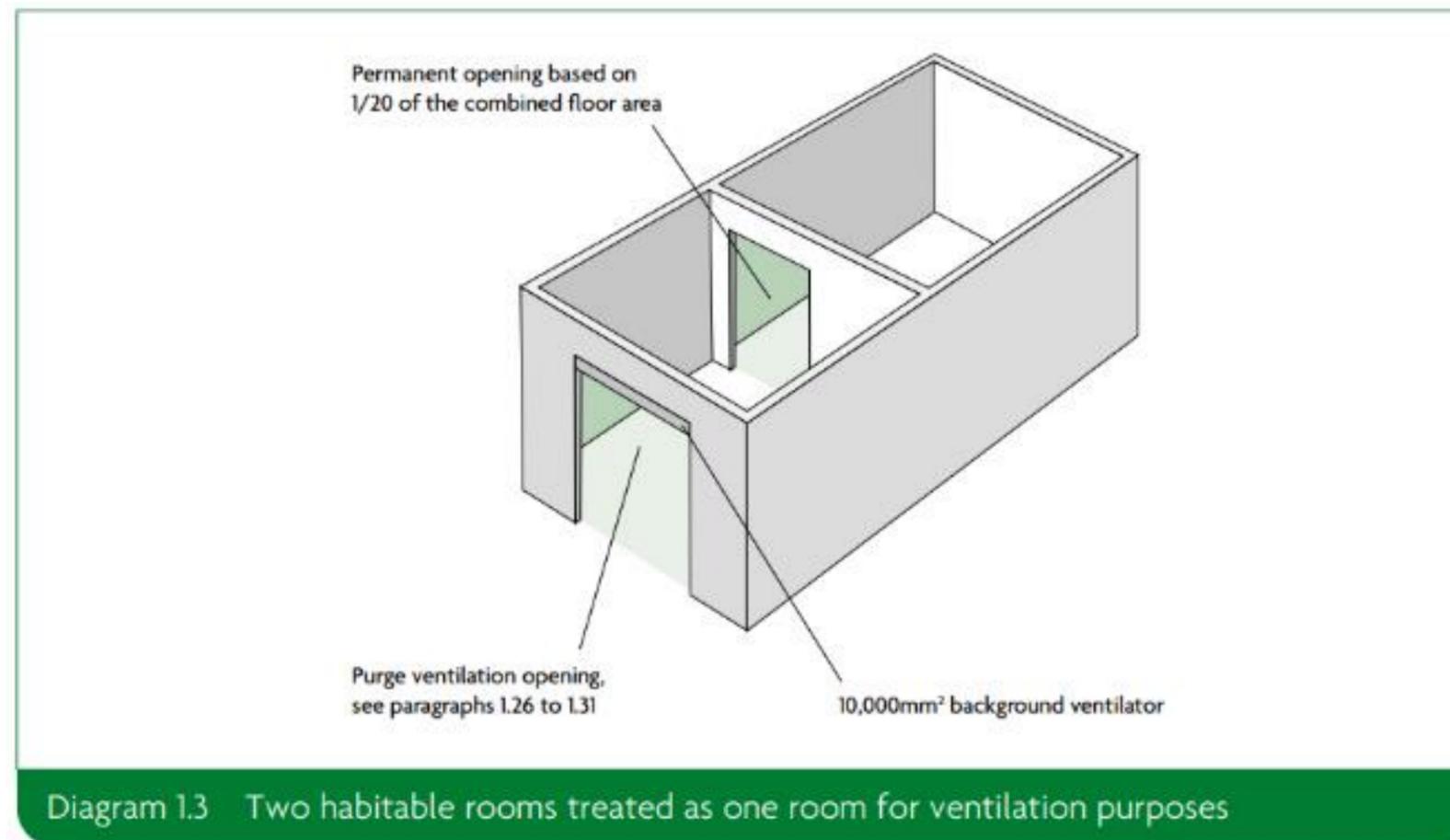
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3. The total number of ventilators installed in a dwelling's habitable rooms and kitchens should be no fewer than five, except in one-bedroom properties, where there should be no fewer than four.
4. If a bathroom has no window or external façade through which a ventilator can be installed, the minimum equivalent area specified should be added to the ventilator sizes specified in other rooms.

Ventilation of a Habitable Room through Another Room

If a habitable room does not contain windows that can be opened. This guidance can be used if the room is ventilated through either of the following:

- Another habitable room
- A conservatory



Purge Ventilation

- Purge ventilation is required for rapid dilution and removal of high concentrations of pollutants from occasional activities, usually by opening windows
- Must be capable of achieving at least 4 air changes per hour (ACH)
- Achievable via openings or mechanical extract ventilation
- This applies to all ventilation systems

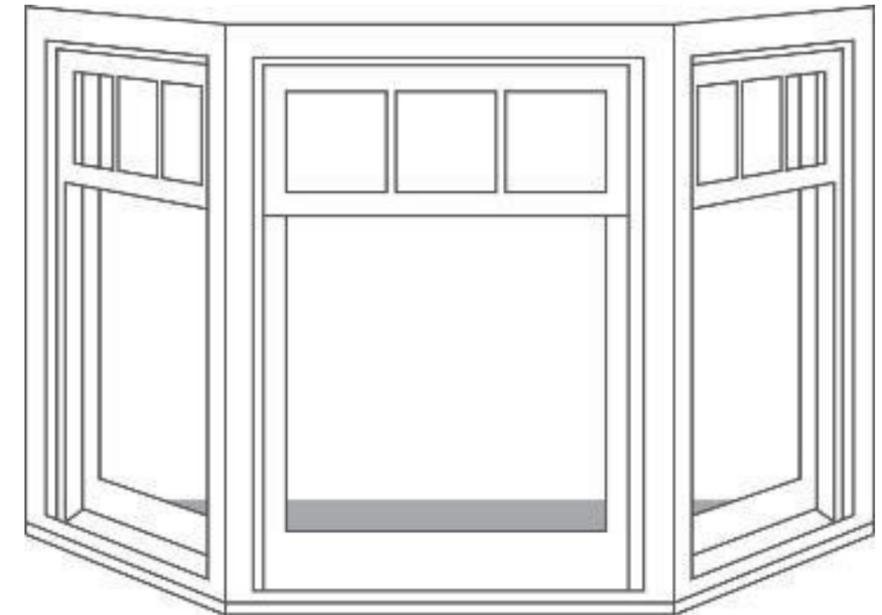


Table 1.4 Purge ventilation openings

Opening type	Minimum total area of openings
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	

The values in Table 1.4 are based on BS 5925 assumptions

Door Undercuts

Internal doors should allow air to flow through the dwelling.

Achieving a minimum free area equivalent to a 10mm undercut to a 760mm wide door.

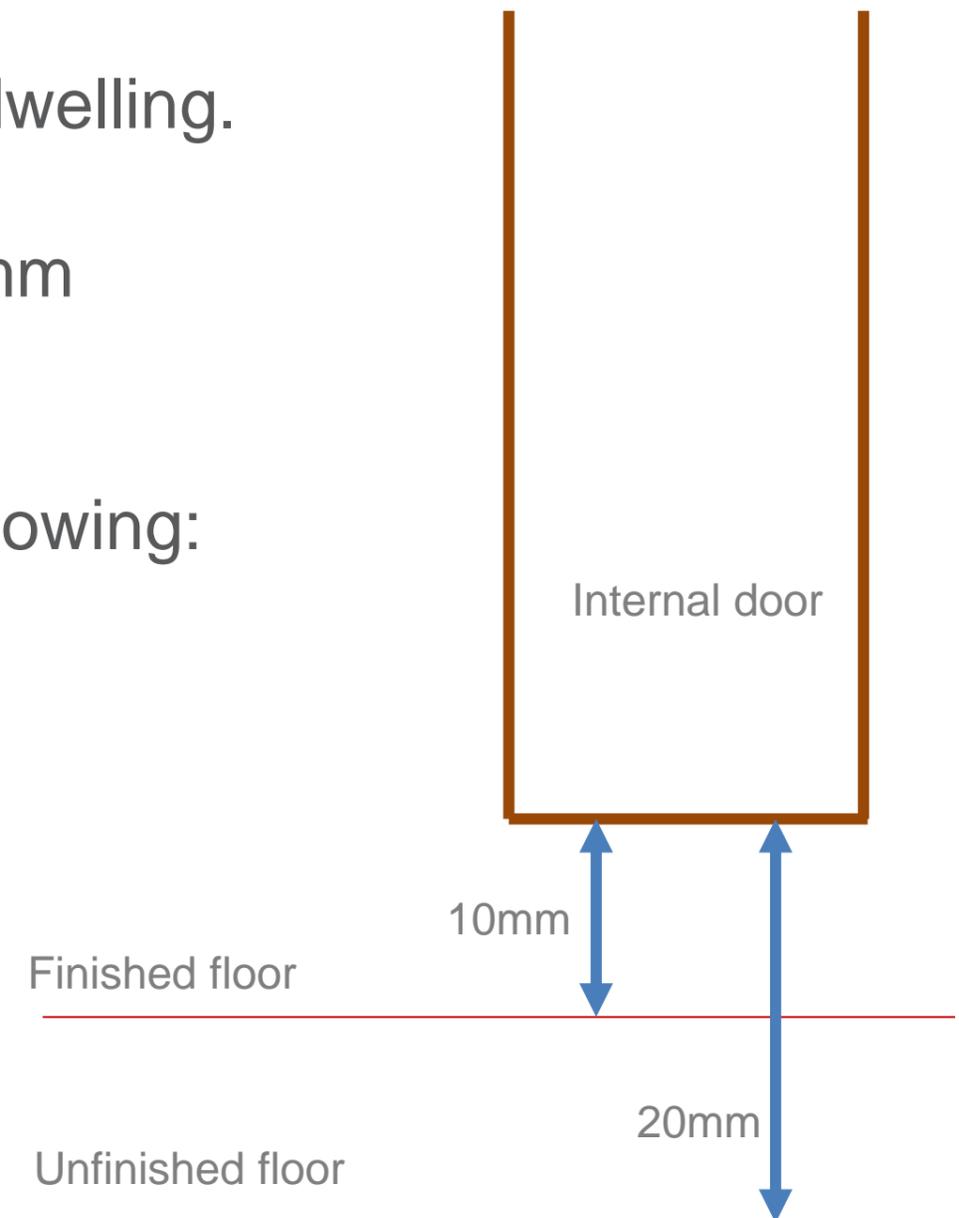
Doors should be undercut to achieve one of the following:

- 10mm above the floor finish
- 20mm above the floor surface

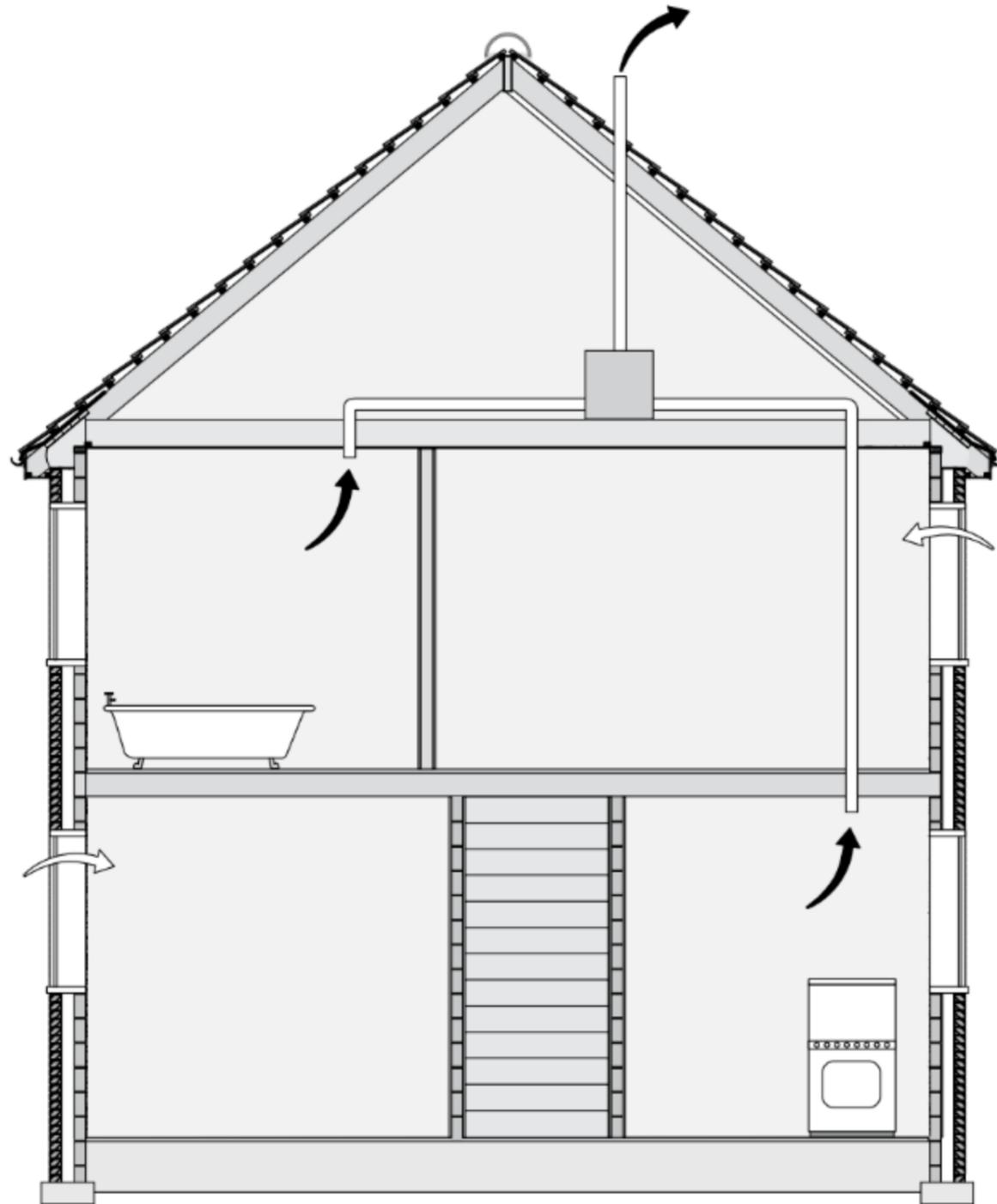
This applies to all ventilation systems.

This remains unchanged to the previous version of building regulations.

Wording has changed to specify a 10mm undercut for a 760mm wide door, instead of specifying a 7600mm² minimum area for the undercut.



Continuous Mechanical Extract Ventilation



Decentralised MEV
(dMEV)



Centralised MEV
(MEV)



This could consist of the following:

- A central extract system (MEV)
- Individual room extract fans (dMEV)
- A combination of a central extract system and individual room extract fans (MEV + dMEV)

Continuous Mechanical Extract Ventilation

Decentralised MEV



Decentralised Mechanical
Extract Ventilation

Continuous Mechanical Extract Ventilation Centralised MEV



Mechanical
Extract Ventilation

Continuous Mechanical Extract Ventilation Design Performance

Each wet room should have a minimum continuous mechanical extract ventilation high rate as given in Table 1.2.

Table 1.2 Minimum extract ventilation rates for continuous extract systems⁽¹⁾

Room	High rate (l/s)	Continuous rate
Kitchen	13	The sum of all extract ventilation in the dwelling on its continuous rate should be at least the whole dwelling ventilation rate given in Table 1.3
Utility room	8	
Bathroom	8	
Sanitary accommodation	6	

NOTE:

1. If the continuous rate of ventilation provided in a room is equal to or higher than the minimum high rate specified in the table, no extra ventilation is needed.

Continuous Mechanical Extract Ventilation Design Performance

The total combined rate of continuous mechanical extract ventilation in the dwelling should be at least the whole dwelling ventilation rate in Table 1.3.

Table 1.3 Minimum whole dwelling ventilation rates determined by the number of bedrooms

Number of bedrooms ⁽¹⁾⁽²⁾	Minimum ventilation rate by number of bedrooms (l/s)
1	19
2	25
3	31
4	37
5	43

NOTES:

1. If the dwelling only has one habitable room, a minimum ventilation rate of 13l/s should be used.
2. For each additional bedroom, add 6l/s to the values in Table 1.3.

The minimum whole dwelling ventilation rate in a dwelling should meet the higher of two following results:

- A minimum rate of 0.3 l/s per m² of internal floor area
- A minimum rate determined by the number of bedrooms, as per Table 1.3.

Continuous Mechanical Extract Ventilation Background Ventilators

Where continuous mechanical extract ventilation is used, background ventilators should be used.

Minimum total number of ventilators:
Number of bedrooms + 2

(i.e. a two-bedroom dwelling should have 4 background ventilators)

Previously, background ventilators needed to be 2,500mm² and only needed to be fitted in each habitable room.

	Minimum background ventilator size
Habitable rooms	4000mm ²
Wet rooms	Not applicable

Continuous Mechanical Extract Ventilation Prevailing Wind and Exposed Façades

If an exhaust air terminal is located on a façade that is exposed to the prevailing wind, measures should be taken to minimise likely wind effects. Solutions could include the following:

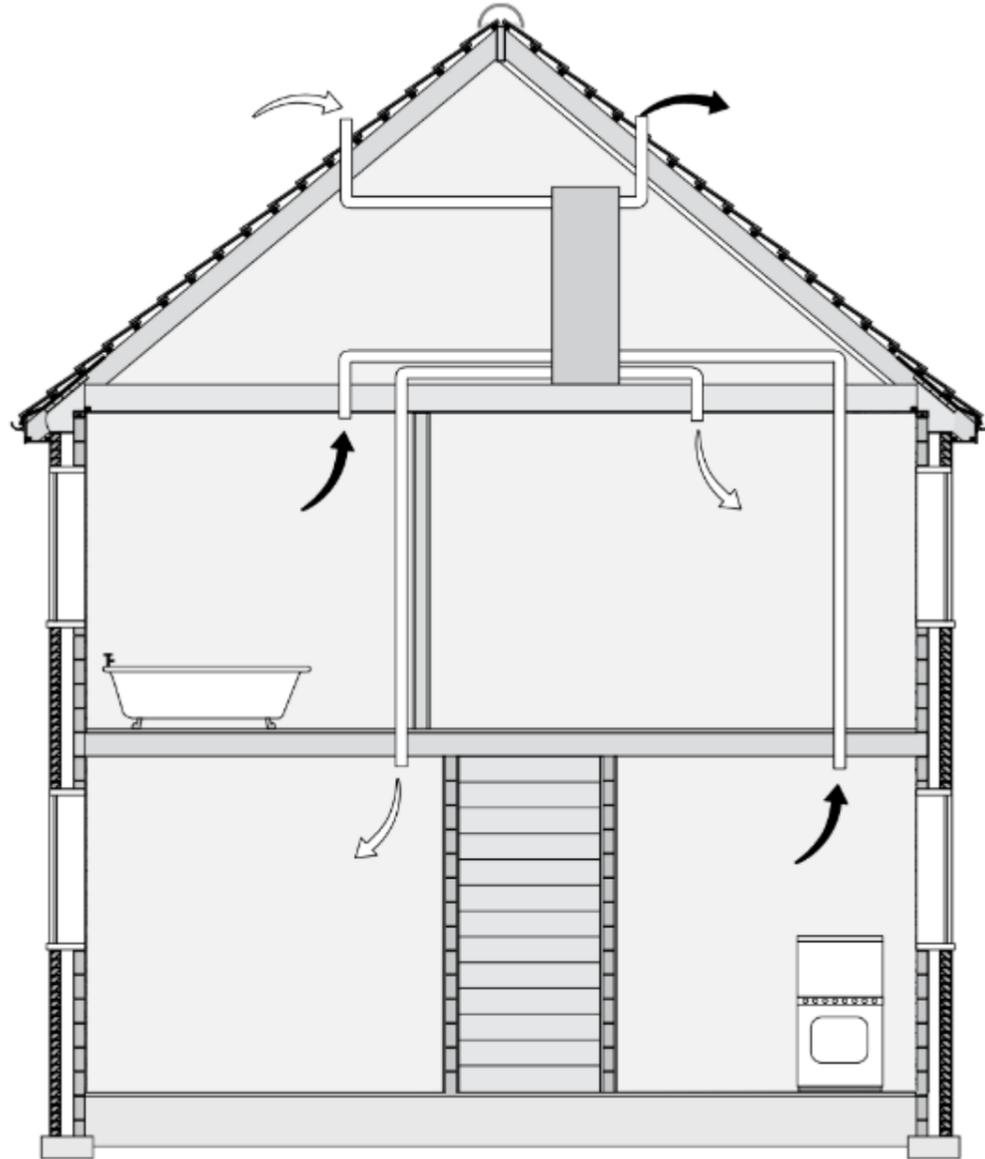
Ducting to another façade

Use of constant volume flow rate units

Seeking expert advice



Mechanical Ventilation with Heat Recovery



MVHR

Mechanical Ventilation with Heat Recovery Supply and Extract animation



Mechanical Ventilation
with Heat Recovery

Mechanical Ventilation with Heat Recovery

Design Extract Performance

Each wet room should have a minimum continuous mechanical extract ventilation high rate as given in Table 1.2.

Room	High rate (l/s)	Continuous rate
Kitchen	13	The sum of all extract ventilation in the dwelling on its continuous rate should be at least the whole dwelling ventilation rate given in Table 1.3
Utility room	8	
Bathroom	8	
Sanitary accommodation	6	

NOTE:

1. If the continuous rate of ventilation provided in a room is equal to or higher than the minimum high rate specified in the table, no extra ventilation is needed.

Mechanical Ventilation with Heat Recovery

Design Extract Performance

The total combined rate of continuous mechanical extract ventilation in the dwelling should be at least the whole dwelling ventilation rate in Table 1.3.

Table 1.3 Minimum whole dwelling ventilation rates determined by the number of bedrooms

Number of bedrooms ⁽¹⁾⁽²⁾	Minimum ventilation rate by number of bedrooms (l/s)
1	19
2	25
3	31
4	37
5	43

NOTES:

1. If the dwelling only has one habitable room, a minimum ventilation rate of 13l/s should be used.
2. For each additional bedroom, add 6l/s to the values in Table 1.3.

The minimum whole dwelling ventilation rate for the supply of air to the habitable rooms in a dwelling should meet the higher of two following results:

A minimum rate of 0.3 l/s per m² of internal floor area

A minimum rate determined by the number of bedrooms, as per Table 1.3.

Mechanical Ventilation with Heat Recovery

Design Supply Performance

The extract air flow should equal the supply air flow, to make a balanced system.

The supply air flow should be evenly distributed to the volume of each habitable room.

Mechanical supply terminals should be located and directed to avoid draughts.

Table 1.3 Minimum whole dwelling ventilation rates determined by the number of bedrooms

Number of bedrooms ⁽¹⁾⁽²⁾	Minimum ventilation rate by number of bedrooms (l/s)
1	19
2	25
3	31
4	37
5	43

NOTES:

1. If the dwelling only has one habitable room, a minimum ventilation rate of 13l/s should be used.
2. For each additional bedroom, add 6l/s to the values in Table 1.3.

Other Ventilation Systems Positive Input Ventilation

The approved document F shows examples of ventilation systems that comply.

Other ventilation systems may be acceptable if they are shown to meet an equal level of performance.



Design considerations: Noise and pollution

Design Considerations: Noise

Ventilation operating under normal conditions and not at boost rates, should not exceed the following:

	Noise sensitive rooms	Less noise sensitive room
Continuous ventilation	30 dB _{LAeq,T} *	45 dB _{LAeq,T} *
Intermittent ventilation	N/A	45 dB _{LAeq,T} *

Noise sensitive rooms – Bedrooms and living rooms

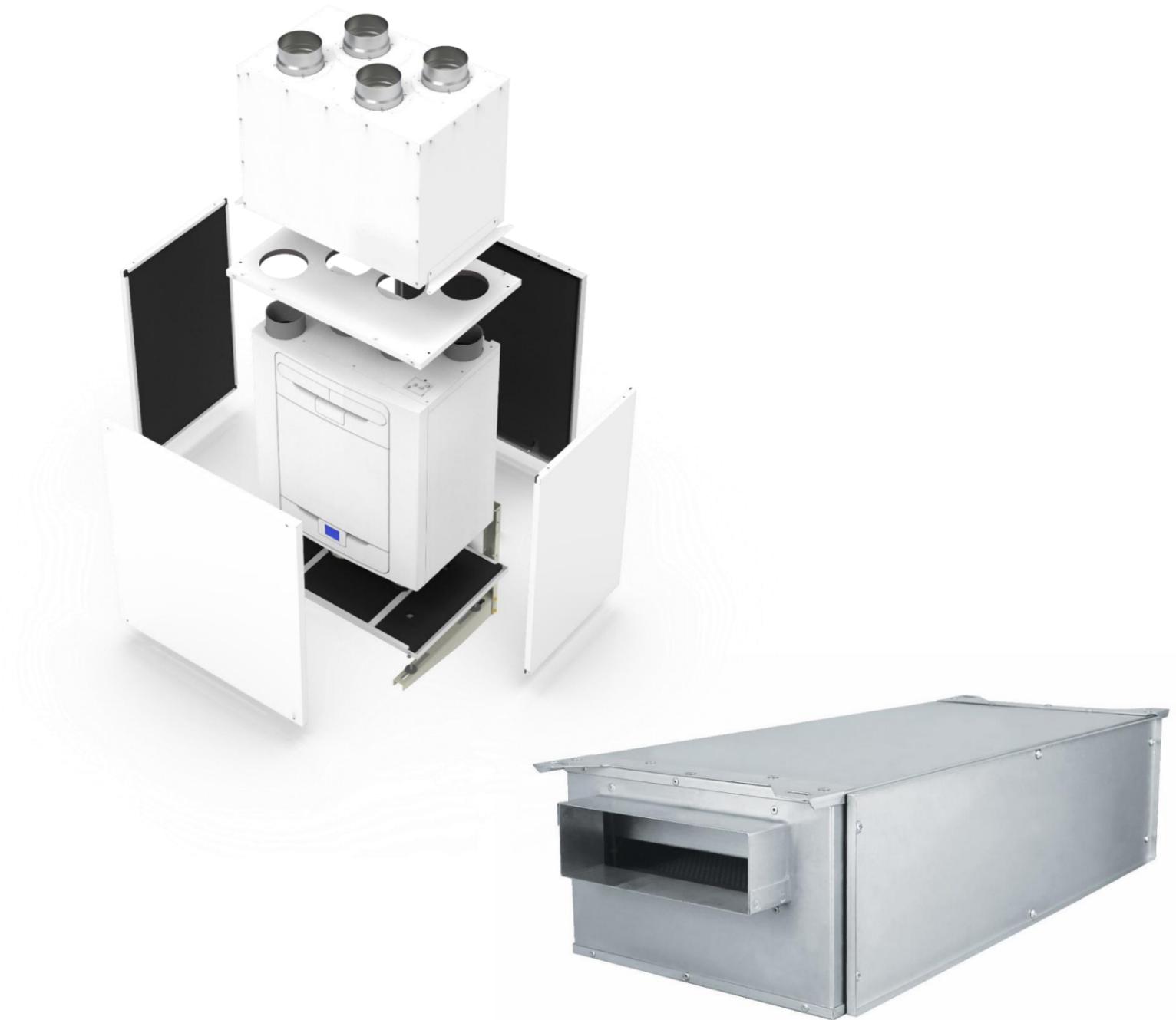
Less noise sensitive rooms – Kitchens and bathrooms

*The noise index LAeq,T is used in BS 8233, where T is the duration of the measurement



Design Considerations: Noise

- Attenuators
- Acoustic enclosures
- Acoustic top boxes



Design Considerations: Ingress of Pollutants

- Ventilation intakes should be located away from sources of local pollution
- Ventilation intakes should not be located in enclosed urban spaces
- Where sources of pollution vary with the time of day, it may be acceptable to time-limit periods to reduce flow of intake air

Table 2.1 Limit values from Schedule 2 to the Air Quality Standards Regulations 2010

Pollutant	Exposure limit	Exposure time
Carbon monoxide	10mg/m ³	8-hour average
Sulphur dioxide	350µg/m ³	1-hour average
	125µg/m ³	1-day average
Nitrogen dioxide	200µg/m ³	1-hour average
	40µg/m ³	1-year average
Benzene	5µg/m ³	1-year average
Lead	0.5µg/m ³	1-year average
PM _{2.5}	25µg/m ³	1-year average
PM ₁₀	50µg/m ³	1-day average
	40µg/m ³	1-year average

NOTE: This section only gives guidance for typical situations. **Expert advice** may also be able to provide additional guidance on the suitability of other technologies to minimise the intake of external air pollutants, including filtration.

Design Considerations: Ingress of Pollutants

Filtration

- For higher levels of filtration including the removal of pollutant gases such as NO₂, SO₂, O₃, a separate IAQ filter may be required



Installation and commissioning

Domestic Ventilation Installation

Mechanical ventilation must be commissioned to provide adequate ventilation. A commissioning notice must be given to the building control body.

This applies to both systems and intermittent fans.



Installation

Ventilation systems should be installed to meet the following:

Comply with the guidance within ADF

Not compromise the performance of the system.

Adequate space should be available for access to maintain ventilation equipment.

Make a visual inspection to confirm:

- There are no obvious defects
- All packaging has been removed



Good installation



Poor installation

Installation: Ductwork

Ductwork should be designed and installed to minimise pressure losses by :

- Minimising the overall length of duct
- Minimising the number of bends required
- Installing appropriately sized ducts for the air flow rate

Duct connections should be secured and sealed to prevent leaks.

Each air terminal should have a free area of at least 90% of the free area of its associated duct.



Good installation



Poor Installation

Installation: Flexible Ductwork

Flexible ductwork, should meet all the following:

- Only used for final connections
- Lengths should be a maximum of 1.5m

Any flexible duct should:

- Maintain full internal diameter
- Minimise flow resistance

Achieved by:

- Pulling the duct taut
- Ensuring that ductwork does not pass-through gaps smaller than its diameter
- Not in a position that can be crushed



Good
installation



Poor
Installation

Commissioning: Air flow Rates

The air flow rate of all mechanical ventilation fans should be tested. This includes any of the following:

- Intermittent extract fans
- Cooker hoods
- Continuous extract fans and/or terminals
- Continuous supply fans and/or terminals

The correct equipment should be used to measure the air flow rates



Good practice



Poor practice

Commissioning: Air flow Rates

Some fan configuration may prevent the air flow from being measured

In these scenarios, flow rates can be determined by manufacturers guidance and then shared with building control.

Commissioning: Domestic Ventilation Compliance Checklist

Mechanical ventilation systems must be commissioned in accordance with an approved procedure.

Approved document Part F states:
Mechanical ventilation systems must be commissioned to provide adequate ventilation.

Air flow rates for mechanical ventilation in new dwellings must be measured.

Both must be given to building control.

Approved document Part L states:
Mechanical ventilation must be commissioned to ensure that they use no more fuel and power than is reasonable in the circumstances.

Commissioning checklist can be found within Appendix C of Part F.

Part 1 – System details and declarations

The installer should complete this section and include details of the commissioning engineer.

1.1 Installation address details	
Dwelling name/number	
Street	
Town	
County	
Postcode	
1.2 System details	
System classification*	
<i>Enter 'natural ventilation', 'mechanical extract ventilation' or 'as defined by Approved Document F'.</i>	
Manufacturer	
Model numbers	
Serial number (where available)	
Location of fan units	1.
	2.
	3.
	4.
	5.
	6.
	7.
1.3 Installation engineer's details	
Engineer's name	
Company	
Address line 1	
Address line 2	
Postcode	
Telephone number	
1.4 Commissioning engineer's details (if different to 1.3)	
Engineer's name	
Company	
Address line 1	
Address line 2	
Postcode	
Telephone number	
Email address	

*NOTE: If a system has been installed that is not defined in Approved Document F, further installation checks and commissioning procedures may be required. Seek guidance from the manufacturer for such systems.

Thank you for your attention.

Any questions?