

# APPROVED DOCUMENT F

## VENTILATION



### PUBLISHED IN 1 VOLUME: F1 MEANS OF VENTILATION

**The key aim of the requirement of Part F1 is that a ventilation system should be provided that, under normal conditions, is capable of limiting the accumulation of moisture and pollutants originating within a building which would otherwise become a hazard to the health of people within the building.**

The document is applicable for new dwellings, buildings other than dwellings or work on existing buildings.

Requirement F1 does not apply to a building or space within a building:

- A. INTO WHICH PEOPLE DO NOT NORMALLY GO; OR**
- B. WHICH IS USED SOLELY FOR STORAGE; OR**
- C. WHICH IS A GARAGE USED SOLELY IN CONNECTION WITH A SINGLE DWELLING.**

Ventilation is described as simply the removal of 'stale' indoor air from a building and its replacement with 'fresh' outside air. The document assumes that outside air is of reasonable quality and states that ventilation is required for the following purposes:

- A. PROVISION OF OUTSIDE AIR FOR BREATHING;**
- B. DILUTION AND REMOVAL OF AIRBORNE POLLUTANTS, INCLUDING ODOURS;**
- C. CONTROL OF EXCESS HUMIDITY (ARISING FROM WATER VAPOUR IN INDOOR AIR);**
- D. PROVISION OF AIR FOR FUEL BURNING APPLIANCES (SEE PART J OF BUILDING REGULATIONS)**

Ventilation may also provide a means to control thermal comfort but this is not controlled under Building Regulations.

**Part L – Conservation of fuel and power** addresses minimising energy use due to the effects of solar gain in summer.

Part F1 explains that buildings are ventilated through a combination of infiltration (uncontrollable air leakage) and purpose provided ventilation (controllable air exchange by natural or mechanical devices) and it states the importance of minimising uncontrollable air infiltration (see also Part L).

The air permeability limiting value in Part L is  $10\text{m}^3/\text{hour}/\text{m}^2$  @ 50 Pa., but modern methods of construction can achieve significantly more airtight buildings of typically  $5\text{m}^3/\text{hour}/\text{m}^2$  or lower. As a result, Part F (New Dwellings) sets out minimum guidance requirements for "all levels of design air permeability" (assumes zero air permeability and thus no infiltration), or alternatively for buildings that are leakier than  $5\text{m}^3/\text{hour}/\text{m}^2$ .

In the case of new dwellings, minimum rates are set out for both Extract ventilation and Whole dwelling ventilation and describes 4 alternative Systems for achieving the requirements.

### THE VENTILATION STRATEGY ADOPTED IN APPROVED DOCUMENT F REQUIRES:

- **Extract ventilation** – from rooms where most water vapour and/or pollutants are released, e.g. kitchens, bathrooms, utility rooms and sanitary accommodation in order to minimise spread to the rest of the building. The method of extract can be intermittent or continuous.
- **Whole building/dwelling ventilation** – to provide nominally continuous fresh air exchange to the building and to dilute and disperse residual water vapour and pollutants not dealt with by extract ventilation.
- **Purge ventilation** – throughout the building to aid removal of high concentrations of pollutants and water vapour released from occasional activities such as painting and accidental release of smoke from burnt food or water spillage. Purge ventilation is intermittent and required only when such activities occur.

This ventilation strategy can be delivered by either a natural ventilation system or a mechanical ventilation system or a combination of both.

For mainly naturally ventilated buildings, it is common to use a combination of ventilators to achieve this strategy; so for example:

- Intermittent extract fans for extract ventilation.
- Trickle ventilators for whole dwelling ventilation.
- Opening windows for purge ventilation.

For mechanically ventilated or air-conditioned buildings, it is common for the same ventilators to provide both local extract and whole building/dwelling ventilation and for buildings other than dwellings, to provide purge ventilation as well.

In all cases, it is important that ventilation is controllable so that it can maintain reasonable air quality and at the same time avoid waste of energy. Controls can be either manual or automatic.

Manually controlled trickle ventilators should be positioned typically 1.7m above floor level to avoid discomfort due to cold draughts and are intended to be normally left open in occupied rooms in dwellings. The equivalent area of trickle vents should be marked, either permanently or temporarily on the product for inspection purposes.

Windows with a night vent facility are not recommended for the purpose of Part F because of the difficulty of measuring the equivalent area for background ventilation reasons.

## Ventilation systems for dwellings

### BUILDING DESIGNERS WILL SELECT ONE OF THE FOLLOWING FOUR VENTILATION SYSTEMS ILLUSTRATED IN DIAGRAM 2A

**System 1:** Background ventilators and intermittent extract fans.

**System 2:** Passive stack ventilation (PSV).

**System 3:** Continuous mechanical extract ventilation (MEV).

**System 4:** Continuous mechanical supply and extract with heat recovery (MVHR).

Guidance on the minimum total equivalent area provisions for Whole dwelling ventilation (background ventilators) is set out in the document for each of the four Systems for both “dwellings with any design permeability” and “dwellings with a design permeability leakier than  $5\text{m}^3/\text{hour}/\text{m}^2 @ 50\text{ Pa}$ ”.

The guidance is subject to the total floor area of the building, the number of bedrooms it contains and occupancy levels. Further rules apply for single aspect situations (limited opportunity for cross ventilation), where two habitable rooms are treated as a single room for ventilation purposes, where a habitable room is ventilated through a conservatory and for basement locations.

#### KEY FEATURES:

##### **System 1: Background ventilation and intermittent extract fans.**

- Background ventilation equivalent areas are almost certainly not achievable via trickle vents for the “any design permeability” option because the size and quantity of windows are likely to be insufficient.
- Background ventilation equivalent areas are reduced for “leakier dwellings” but still difficult to achieve via trickle vents for typical buildings.
- At least  $5000\text{ mm}^2$  Ea should be provided in each habitable room and  $2500\text{ mm}^2$  Ea in each wet room.

##### **System 2: Passive stack ventilation (PSV).**

- Background ventilation requirements and issues as System 1.

##### **System 3: Continuous mechanical extract (MEV).**

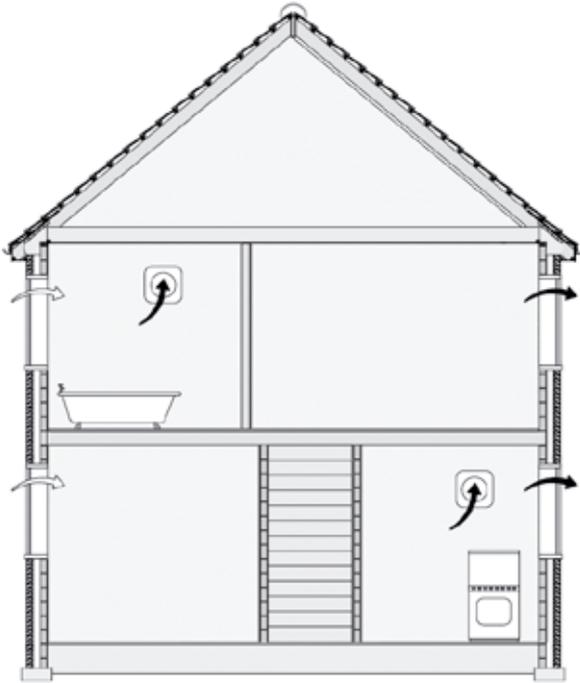
- Currently the most popular option where continuous mechanical extract in kitchens, bathrooms, utility rooms and WCs reduces the equivalent area requirements for background ventilation in other habitable rooms.
- For “any design permeability”, controllable background ventilators having a minimum equivalent area of  $2500\text{ mm}^2$  should be provided in each room, except wet rooms, from which air is extracted.
- Where the designed air permeability is leakier than  $5\text{m}^3/\text{hour}/\text{m}^2 @ 50\text{ Pa}$ , background ventilators are not necessary.

##### **System 4: Continuous mechanical supply and extract with heat recovery (MVHR).**

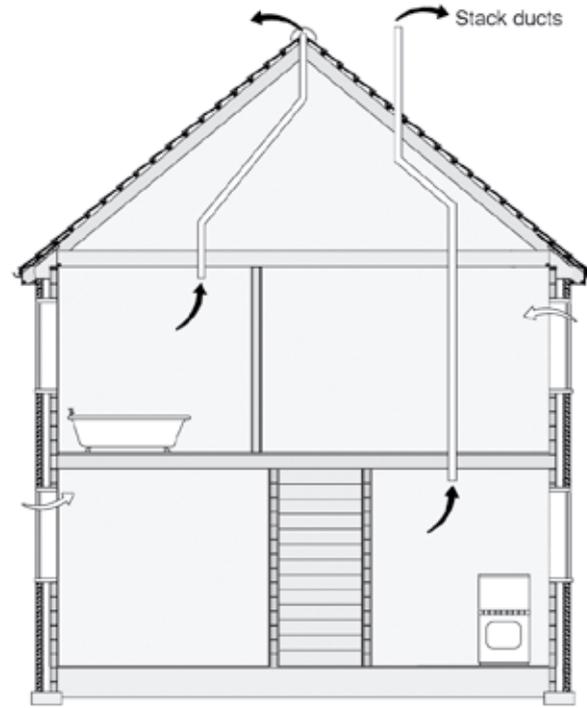
- The most comprehensive single method of achieving the required standards, but expensive to install.
- Background ventilators are not required.

## Appendix A: Diagram 2a Ventilation Systems

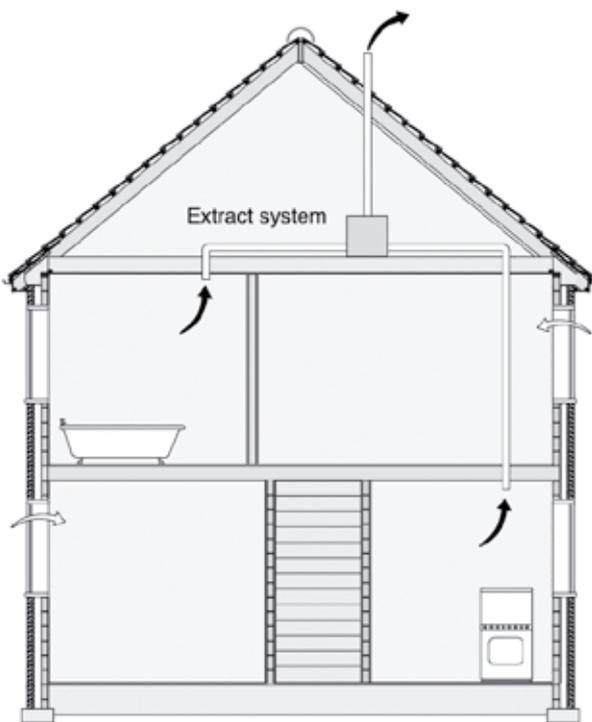
**Background ventilators and intermittent extract fans**



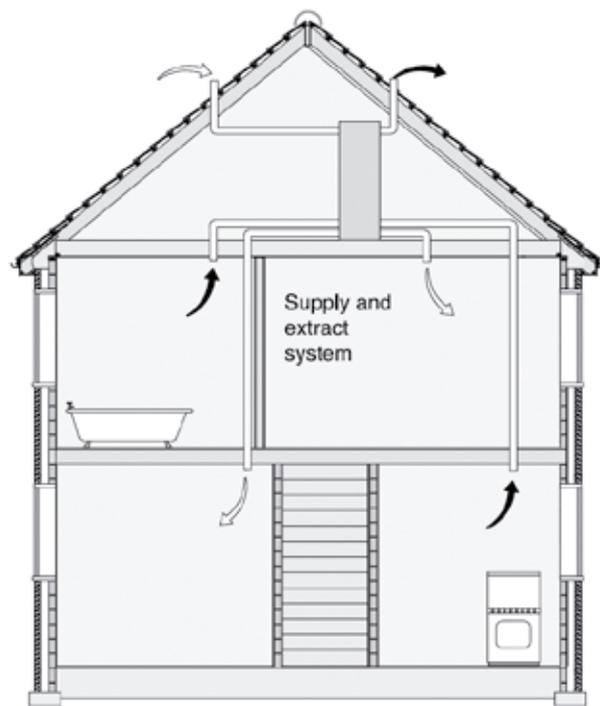
**Passive stack ventilation**



**Continuous mechanical extract**



**Continuous mechanical supply and extract with heat recovery**



## Appendix B: Purge Ventilation

### KEY FEATURES:

- Adequate purge ventilation may be achieved by the use of openable windows and/or external doors.
- For a hinged or pivot window that opens 30° or more, the height x width of the opening part should be at least 1/20th of the floor area of the room.
- For a hinged or pivot window that opens between 15° and 30°, the height x width of the opening part should be at least 1/10th of the floor area of the room. Care should be taken when considering purge ventilation in circumstances where windows are required to be permanently restricted.
- If a window opens less than 15°, it is not suitable for providing purge ventilation and other arrangements should be made.
- If a room contains more than one openable window, the areas of all the opening parts may be added to achieve the required proportion of the floor area.
- Approved Document B (Fire Safety) includes provisions for the size of escape windows. The larger of the provisions in Approved Document B or F should apply in all cases.
- For an external door, the height x width of the opening part should be at least 1/20th of the floor area of the room.
- If the room contains more than one external door, the areas of all the opening parts may be added to achieve at least 1/20th of the floor area of the room.
- If the room contains a combination of at least one external door and one openable window, the areas of all the opening parts may be added to achieve at least 1/20th of the floor area of the room.

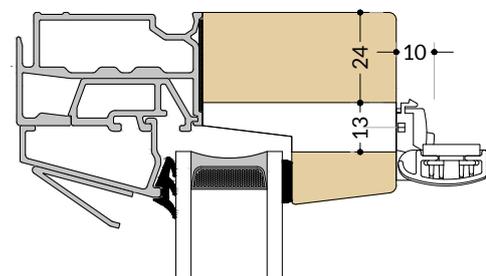
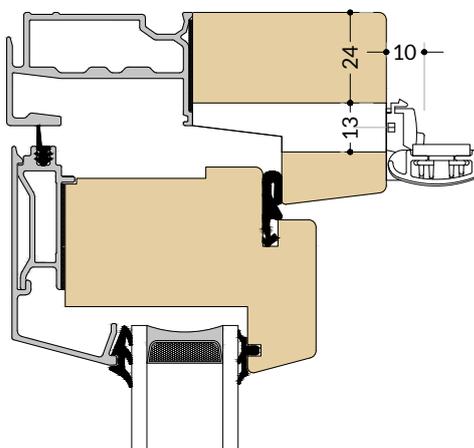
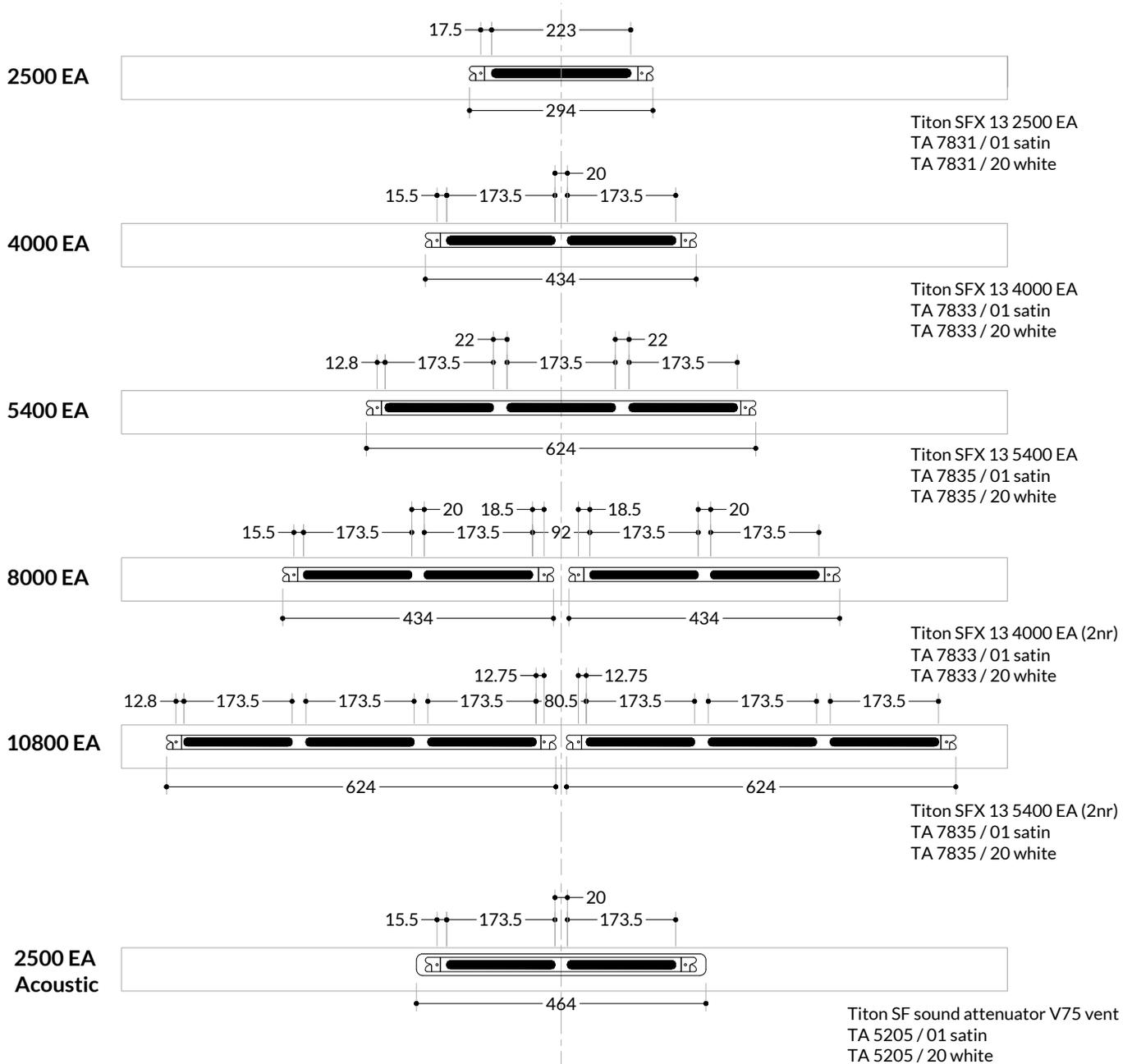
## Work on existing buildings

### KEY FEATURES:

- Where the original windows were fitted with trickle vents, replacement windows should be provided with new controllable vents which should be no smaller than the original.
- Where the original windows were not fitted with trickle vents and the room is not ventilated adequately by other installed provisions, it is considered good practice to fit controllable trickle vents to the new windows as follows:
- For dwellings
  - Habitable rooms – 5000 mm<sup>2</sup> equivalent area.
  - Kitchen, utility room, bathroom (with or without WC) – 2500 mm<sup>2</sup> equivalent area.
- For buildings other than dwellings
  - Occupiable rooms (up to 10 m<sup>2</sup>), kitchens (domestic type), bath and shower rooms and sanitary accommodation – 2500 mm<sup>2</sup> equivalent area.

## Ventilation systems for buildings other than dwellings

Section 6 of Approved Document F1 sets out guidance on how to comply with Building Regulations 2010 for offices, car parks and a whole variety of different commercial and retail buildings by reference to Extract and Whole building ventilation rates and particularly Application Manuals published by the Chartered Institution of Building Services Engineers (CIBSE).



System: ALL  
 Detail: TRICKLE VENTS  
 Drawing No: S014  
 Scale: 1:1 @ A4

minimum frame widths required					
Vent	Outward Opening Sash	Outward Opening Fixed	Outward Opening Sash with mullion	Outward Opening Fixed with mullion	Inward Opening Sash & Fixed
2500 EA	394	455	434	455	425
4000 EA	534	565	574	565	535
5400 EA	764	804	764	804	774
8000 EA	1018	1000	1058	1000	1018
10800 EA	1208	1478	1248	1478	1448