Master Document for

NSAI Agrément Approval Scheme for

Ventilation Validation Registration Scheme

to

I.S. EN 14134:2019, *Ventilation for buildings - Performance testing and installation checks of residential ventilation systems*

Table of Content

1.0 Introduction

NSAI has established a registration scheme that certifies an individual as a competent independent third party to validate that a ventilation system has been installed, balanced and commissioned to meet the minimum requirements of Technical Guidance Document F - Ventilation (2019) to the Irish Building Regulations. Checks and measurement methods broadly follow the guidance given in I.S. EN 14134:2019, *Ventilation for buildings – Performance testing and installation checks of residential ventilation systems.*

Ventilation systems' must be designed and commissioned to provide adequate and effective means of ventilation to satisfy the minimum requirements of F1 of TGD to Part F of the Irish Building Regulations.

This shall be achieved by:

(a) limiting the moisture content of the air within the building so that it does not contribute to condensation and mould growth, and

(b) limiting the concentration of harmful pollutants in the air within the building.

The primary purpose of a residential ventilation system is to supply air to and extract air from the rooms in a dwelling.

The system should be designed to achieve the primary purpose whilst minimizing energy use and environmental problems such as noise and thermal discomfort.

The required performance of the ventilation system is laid down by the designer in the design specifications.

The purpose of the functional measurements is to give proper assurance that the system complies with the design specifications with respect to the following aspects of performance:

- air flow rate and direction of flow.
- control and running time.

Successful applicants to register on this certification scheme will satisfy the requirement of Clause 1.2.1.10 of TGD to Part F, namely they will be considered a competent person to carry out the validation that a ventilations system has been installed, balanced and commissioned to meet the minimum requirements of the Building Regulations.

What are the Benefits?

For consumers, the benefits of Ventilation validation are far-reaching. Homeowners can be reassured that, at the time of validation, then ventilation system as installed in their dwelling provided the minimum ventilation rates as required under TGD to Part F - Ventilation (2019) of the Building Regulations.

As a result, Homeowners can be reassured that best practice has been achieved to

(a) limiting the moisture content of the air within the building so that it does not contribute to condensation and mould growth, and

(b) limiting the concentration of harmful pollutants in the air within the building.

Homeowners are reminded that adjustments to ventilation systems must only be carried out by competent installers.

Clause 1.2.1.2 of TGD to Part F - Ventilation (2019) of the Building Regulations requires that provision should be made to facilitate transfer of air and cross ventilation between rooms, e.g. a 10 mm gap should be provided under doors.

Ventilation systems will require regular maintenance to clean filters and establish that equipment is operating correctly.

2.0 Reference Documents

Technical Guidance Document (TGD) to Part F of the Irish Building Regulations 2019.

Installation and Commissioning of Ventilation Systems for Dwellings - Achieving Compliance with Part F 2019 published by the Department of Housing, Planning and Local Government.

I.S. EN 14134: 2019, *Ventilation for buildings - Performance measurement and checks for residential ventilation systems*

BSRIA Guide BG 46/2015, *Domestic Ventilation Systems, A guide to measuring airflow rates*

BSRIA Guide BG 43/2013: *Flexible ductwork, a guide to specification, procurement, installation and maintenance*.

BESA Guide to Good Practice TR/35 Low Energy Ventilation for Residential Buildings

Back to Top

3.0 Definitions

3.1 A Vane anemometer is a device used for measuring air flow rate. These are typically calibrated to measure airflow in one direction.

3.2 Air change rate at reference pressure, air leakage rate per internal volume at the test reference pressure (50Pa) differential across the building envelope.

$$\text{Air Leakage Rate}\left(\frac{\text{ac}}{\text{hr}}\right) = \frac{\text{Volume of air going through the fan at 50 Pa in m}^3}{\text{volume of the building (m}^3\text{)}}$$

3.3 Air Leakage rate, air flow rate across the building envelope.

3.4 Air flow measuring devices, three different airflow measurement methods that can be used for domestic ventilation installations – the unconditional method, the conditional method and the minimum benchmark method.

3.4.1 **Unconditional method** using a powered flow hood is the preferred measuring device as it is free from site-specific conditions such as fan type, fan model, airflow direction and instrumentation characteristics (See clause 8.1 below).

3.4.2 **Conditional method** requires site specific configuration and assorted correction and conversion factors (K-factors) depending on the type of measuring instrument used (See clause 8.1 below).

3.4.3 **Minimum benchmark method** is suitable for decentralised ventilation systems with intermittent extract fans only (See clause 8.1 below).

3.5 Air permeability (q50), air leakage rate per envelope area at the test reference pressure differential across the building envelope.

$$\text{Air Permeability}\left(\frac{m^3}{hr.m^2}\right) = \frac{Volume\ of\ air\ going\ through\ the\ fan\ at\ 50\ Pa\ in\ m^3}{Envelope\ Area\ (A_E)}$$

3.6 ATD, Air terminal devices

3.7 Background Ventilator, A secure ventilation opening generally located in a wall or window for the purpose of provision of general ventilation, generally incorporating a controllable ventilation grill which can be fully closed.

3.8 Building envelope, boundary or barrier separating the internal volume subject to the test from the outside environment or another part of the building.

3.9 Equivalent Area, the area of a single sharp-edged hole that passes the same air volume flow rate at the same applied pressure difference as the vent being tested.

3.10 Free Area, The geometric open area of a ventilator or terminal.

3.11 I.S. EN 13141-1, *Ventilation for buildings – Performance testing of components/products for residential ventilation – Part 1: Externally and internally mounted air transfer devices.*

3.12 I.S. EN 13141-2, *Ventilation for buildings – Performance testing of components/products for residential ventilation – Part 2: Exhaust and supply air terminal devices.*

3.13 I.S. EN 14134: 2019, *Ventilation for buildings - Performance measurement and checks for residential ventilation systems.*

3.14 Intermittent Extract Fan, this is a mechanical fan which does not run all the time. It operates when a particular need is identified, e.g. when there is a particular need to remove pollutants or water vapour (e.g. during cooking or bathing). Intermittent operation may be in response to automatic control responding to a particular stimulus, or manual control when need identified by user.

3.15 Internal volume, deliberately heated, cooled or mechanically ventilated space within a building or part of a building subject to the measurement, generally not including the attic space, basement space and attached structures.

3.16 Mechanical Ventilation with Heat Recovery (MVHR), A ventilation system that comprises central ducted supply and extract fans with air being supplied into the habitable rooms via a heat recovery unit.

3.17 Obstacles, items which affect the stated function of any component in the ventilation system

3.18 Passive Stack Ventilation (PSV), a ventilation system using ducts from high level locations within rooms to terminals on or above the roof, which provides a flow of air by a combination of the natural stack effect, i.e. the movement of air due to the difference in temperature between inside and outside, and the effect of wind passing over the roof of the dwelling.

3.19 Passive stack ventilation duct, ductwork for passive stack ventilation which does not comprise any mechanical pressure increase devices from duct inlet to duct outlet

3.20 "run-on" timer, device which ensures that air flow through a ventilation system or an air terminal device (ATD) continues for a specific time period after a user operated control has been turned off. (NOTE Commonly used to control exhaust fans which are operated by the room light switch in internal rooms.)

3.21 Single Room Heat Recovery Ventilators (SRHRV), comprise local continuously running balanced supply and extract fans in a single room.

3.22 Specific leakage rate (W50), air leakage rate per net floor area at the test reference pressure differential across the building envelope.

3.23 A 'Ventilation validation Certificates' is the document issued by registered Ventilation validator which records that, at the time of inspection, the as installed and measured ventilation systems matched the as presented designed and commissioned ventilation system.

3.24 Comment on ventilation design. The 'Ventilation validation Certificates' must contain a comment on whether the as presented designed complied with the general ventilation requirements outlined in TGD to Part F of the Building Regulations.

3.25 The 'Ventilation validation Certificates' must contain unique certificate number if the form of the Validators file number (1.94.0xx) followed by the year and a sequential 3-digit figure. (i.e., 1.94.0xx.20.001)

For other terms used throughout this guide, reference should be made to the glossary section in Technical Guidance Document F.

Back to Top

4.0 Ventilation systems for dwellings

4.1 Continuous mechanical extract Ventilation (CMEV)

This type of ventilation system extracts air from wet rooms such as kitchens, bathrooms and utility rooms.

The replacement air is provided by means of background ventilators.

The system can be either a centralised system, comprising a single fan ducted to serve multiple rooms, or a decentralised system (DMEV) where individual fans extract air from each room.

The systems have two ventilation rates - trickle and boost. Exhaust air heat pumps would be considered as a type of centralised MEV.

4.2 Continuous mechanical supply and extract with heat recovery (MVHR)

MVHR is a type of centralised ventilation system that combines supply and extract ventilation in one system.

Typically, warm moist air is extracted from wet rooms and sanitary accommodation such as kitchens, bathrooms and utility rooms via a ductwork system and passed through a heat exchanger before being exhausted to the outside.

Incoming fresh air is pre-heated as it passes through the heat exchanger before being supplied to habitable rooms such as the living room or bedrooms. The systems have two ventilation rates - trickle and boost.

Other types of ventilation systems, such as demand controlled ventilation (DCV) and positive input ventilation (PIV) can be used in Ireland. These systems must be shown to achieve certain performance criteria, such as the removal rate of moisture or indoor pollutants.

4.3 Background ventilators and intermittent extract fans

In this type of decentralised ventilation system, extract fans serve wet rooms and sanitary accommodation such as kitchens, bathrooms, and utility rooms, providing rapid, intermittent air extraction.

The replacement air is provided by means of background ventilators. The term background ventilator refers to small ventilation openings that allow air to enter a building, such as trickle vents around windows or air inlet grilles in external walls.

This system can be activated either by manual or automatic control.

4.4 Passive stack ventilation (PSV)

A variation of the previous system in 4.3 – Natural Ventilation with intermittent extract fans -, Passive Stack Ventilation (PSV) may be used instead of mechanical extract in any location where an extract fan is specified in Table 3. This system comprises of vertical ducts between roof terminals and wet rooms such as kitchens, bathrooms, and utility rooms. Polluted air is drawn up the ducts by wind or stack effects. The replacement air is provided by means of background ventilators.

Passive stack ventilation should be designed and installed in accordance with BRE IP 13/94 and, for kitchens and utility rooms incorporate an automatic humidity sensitive ventilation inlet control grille.

5.0 Building regulations

5.1 TGD to Part L 2019 - Conservation of Fuel and Energy - Dwellings

5.1.1 TGD Part to L 2019 requires an airtight performance level of 5 $m^3/(h.m^2)$ as a reasonable upper limit for air permeability. Where lower levels of air permeability are achieved it is important that purpose provided (or "designed") ventilation is maintained. For this reason, Technical Guidance Document F also provides guidance for buildings with lower air permeability.

5.1.2 It has been empirically determined that building air permeability calculated at a pressure differential of 50 Pascals is approximately 20 times the air change rate at normal conditions.

5.1.3 Air pressure testing should be carried out on all dwellings to demonstrate that an air permeability value less than the backstop value of 5 $m^3/(h.m^2)$ has been achieved.

5.1.4 If satisfactory performance is not achieved in a test, then remedial measures to improve the dwellings level of airtightness must be carried out, the dwelling should then be retested post the remedial measures to demonstrate that an air permeability value less than the backstop value of 5 $m^3/(h.m^2)$ has been achieved.

5.2 TGD to Part F 2019 - Ventilation

5.2.1 TGD to Part F 2019 gives guidance on ventilation design for dwellings including natural ventilation and mechanical ventilation with heat recovery.

5.2.2 TGD to Part F 2019 advises that where the air permeability is greater than 3 $m^3/(h.m^2)$ and lower than 5 $m^3/(h.m^2)$, natural ventilation can be considered as one acceptable ventilation solution for a dwelling. When the air permeability is lower than 3 $m^3/(h.m^2)$ natural ventilation is no longer acceptable and some form of mechanical ventilation system must be considered.

5.3 TGD to Part F 2019 - Extracts on Design requirements from TGD to Part F

1.2.2 Centralised Continuous Mechanical Extract Ventilation (CMEV)

1.2.2.2 The minimum capacity of a centralised continuous mechanical extract ventilation system should be based on the calculated general ventilation rate. The calculated general ventilation rate to be provided by the CMEV is determined as the greater of:

a) 5 l/s plus 4 l/s per person, e.g., 25 l/s for a five person, 3-bedroom semi-detached dwelling. This is based on two occupants in the main and second bedrooms, and a single occupant in the third bedroom. This should be used as the default value, if a greater level of occupancy is expected, then add 4 l/s per occupant.
   Or
b) 0.3 l/s per m2 internal floor area, e.g., 30 l/s for a 100 m2 dwelling.

Table 1: Centralised continuous mechanical extract ventilation systems: minimum extract rates[1]

Wet rooms	Minimum extract rate (l/s)
Kitchen	13[2]
Utility room	8
Bathroom	8
Sanitary accommodation (no bath or shower)	6[3]

Notes:

1 The above are minimum boost extract rates and may need to be increased to achieve the general ventilation rate.

2. Excludes cooker hood extract.

3. As an alternative, an opening window provided for purge ventilation may be relied on for extract.

1.2.2.3 In order to meet extract requirements, the system may require a higher extract or boost capacity depending on the number of wet rooms (kitchens, bathrooms, etc.) and sanitary accommodation. The minimum boost extract rate to be provided for each wet room and sanitary accommodation is specified in Table 1. The required overall minimum boost extract rate is calculated by adding together the relevant individual extract rates specified in Table 1.

The system should be able to provide a capacity of at least:

- 25% over the calculated general ventilation rate in 1.2.2.2, and
- the overall minimum extract boost rate.

"See Design Example in Section 6.0 of this document."

1.2.3 Centralised Mechanical Ventilation with Heat Recovery (MVHR)

1.2.3.2 The minimum capacity of a Mechanical Ventilation with Heat Recovery system should be based on the calculated general ventilation rate, adjusted to allow for air infiltration due to permeability of the building fabric. The calculated general ventilation rate is determined as the greater of

c) 5 l/s plus 4 l/s per person, e.g., 25 l/s for a five person, 3-bedroom semi-detached dwelling. This is based on two occupants in the main and second bedrooms and a single occupant in the third bedroom. This should be used as the default value if a greater level of occupancy is expected, then add 4 l/s per occupant.
Or
d) 0.3 l/s per m2 internal floor area, e.g., 30 l/s for a 100 m2 dwelling.

Table 2: MVHR Systems: Minimum extract rates

Wet rooms	Minimum extract rate (l/s)
Kitchen	13
Utility room	8
Bathroom	8
Sanitary accommodation (no bath or shower)	6[1]

Notes:
1. As an alternative, an opening window provided for purge ventilation may be relied on for extract.

1.2.3.4 In order to meet extract requirements, the system may require a higher extract or boost capacity depending on the number of wet rooms (kitchens, bathrooms, etc.) and sanitary accommodation. The minimum boost extract rate to be provided for each wet room and sanitary accommodation is specified in Table 2. The required overall minimum boost extract rate is calculated by adding together the relevant individual extract rates specified in Table 2.

The system should be able to provide a capacity of at least:
- 25% over the calculated general ventilation rate in 1.2.3.2, and
- the overall minimum extract boost rate.

"See Design Example in Section 6.0 of this document."

1.2.3.5 A Mechanical Ventilation with Heat Recovery system should normally provide air supply to each habitable room with extract from wet rooms. The total supply air flow should usually be distributed in proportion to the habitable room volumes. The system should be capable of an extract rate from each wet room at least equal to that specified in *Table 2*. It is not recommended to connect cooker hoods to Mechanical Ventilation with Heat Recovery systems.

Where cooker hoods are connected the guidance under fire precautions in BRE Digest 398 "*Continuous mechanical ventilation in dwellings*" should be followed.

6.0 Design Examples[1]

6.1 Example 1 - Semi-detached 130m² (MEV)

Ventilation design sheet

Dwelling address		**Example 1 - Mechanical Extract only**					
Dwelling type		**Semi-detached house**					
Total floor area						130.00	m²
Ventilation system							
Date of test							
Installer/builder (if applicable)							
Validation certificate number		1.91.0xx.21.001					
Air permeability <		3	m³/(h.m²)				
Select rooms			**Area**		**Height**		
Kitchen	No.	1					
Utility room	No.	1					
Bathroom/Ensuite (1)	No.	1					
Sanitary accommodation (no bath or shower) (1)	No.	1					
Bathroom/Ensuite (2)	No.	1					
	No.						
	No.						
Living room (1)	No.	1		m²	2.4	m	
Dining room	No.	1		m²	2.4	m	
Playroom	No.	1		m²	2.4	m	
Study room	No.	1		m²	2.4	m	
Reception room	No.			m²		m	
Bedroom 1	No.	1		m²	2.4	m	
Bedroom 2	No.	1		m²	2.4	m	
Bedroom 3	No.	1		m²	2.4	m	
Bedroom 4	No.			m²		m	
Bedroom 5	No.			m²		m	
Bedroom 6	No.			m²		m	
	No.			m²		m	
	No.			m²		m	
	No.			m²		m	

Step 1 - General ventilation rate

Calculated general ventilation rate based on occupancy of the dwelling [TGD F – 1.2.3.2]:		Calculated general ventilation rate based on internal floor area of the dwelling [TGD F – 1.2.3.2]:
5 l/s plus 4 l/s x Persons		Floor Area m² at 0.3 l/s/m²
Persons =	5	
5 l/s + (4 l/s x Persons) =	25.0 l/s	39.0 l/s
(Assume 2 people in main bedroom and second bedroom and 1 person in third bedroom)		

General ventilation rate of the dwelling is the greater of the above = 39.0 l/s

General continuous supply ventilation rate of the dwelling is = 39.0 l/s

General continuous extract ventilation rate of the dwelling is = 39.0 l/s

Step 2 – Overall minimum boost extract ventilation rate

Overall minimum boost extract ventilation rate requirement [TGD F - Table 2]:

Kitchen	1	x	13	=	13
Utility room	1	x	8	=	8
Bathroom/Ensuite (1)	1	x	8	=	8
Sanitary accommodation (no bath or shower) (1)	1	x	6	=	6
Bathroom/Ensuite (2)	1	x	8	=	8
	0	x	0	=	0
	0	x	0	=	0
					43.0 l/s

Step 3 – Ventilation system capacity

25% capacity requirement over general ventilation rate of the dwelling [TGD F - 1.2.3.4]:

Greater of overall minimum boost extract rate and (General ventilation rate * 1.25) = 48.8 l/s

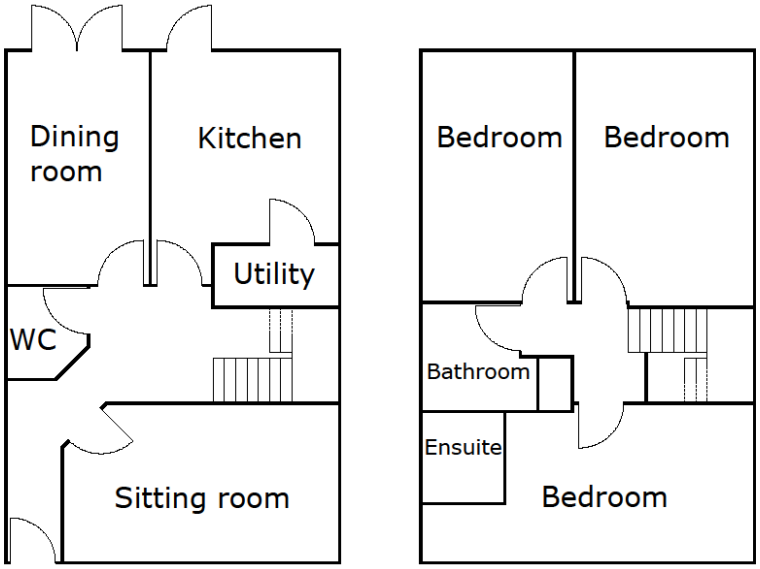
The total capacity of the ventilation system required is = 48.8 l/s

This is the total capacity of the ventilation system that is required.

Extract should be from each wet room and sanitary accommodation. The continuous extract ventilation rate at each extract point is adjusted proportionally.

[1] Example 1-3, 5-10 produced on ***NSAI - MEV MVHR Design Sheet Issue 7th.xlsx***

Controllable background ventilators having a minimum equivalent area of 2,500 mm^2 should be fitted in each habitable room.



Room with MEV/MVHR extract terminal(s)	General Room extract airflow rate (l/s)				
	Extract	% Ext	Per Room	No.	Total
Kitchen	39	30%	11.8 l/s	x 1.0	11.8 l/s
Utility room	39	19%	7.3 l/s	x 1.0	7.3 l/s
Bathroom/Ensuite (1)	39	19%	7.3 l/s	x 1.0	7.3 l/s
Sanitary accommodation (no bath or shower) (1)	39	14%	5.4 l/s	x 1.0	5.4 l/s
Bathroom/Ensuite (2)	39	19%	7.3 l/s	x 1.0	7.3 l/s
		100%	Σ Balance check =		39.0 l/s

Room with MEV/MVHR extract terminal(s)	Room Minimum Boost extract airflow rate (l/s)				
	Extract	% Ext	Per Room	No.	Total
Kitchen	43.0	30%	13.0 l/s	x 1.0	13.0 l/s
Utility room	43.0	19%	8.0 l/s	x 1.0	8.0 l/s
Bathroom/Ensuite (1)	43.0	19%	8.0 l/s	x 1.0	8.0 l/s
Sanitary accommodation (no bath or shower) (1)	43.0	14%	6.0 l/s	x 1.0	6.0 l/s
Bathroom/Ensuite (2)	43.0	19%	8.0 l/s	x 1.0	8.0 l/s
		100%	Σ Balance check =		43.0 l/s

6.2 Example 2 - Semi-detached 130m² (MVHR)

Ventilation design sheet

Dwelling address		**Example 2**					
Dwelling type		**Semi-detached house**					
Total floor area					130.00	m²	
Ventilation system		Centralised Supply & Extract Mechanical Ventilation					
Date of test							
Installer/builder (if applicable)							
Validation certificate number		1.91.0xx.21.001					
Air permeability <				5	m³/(h.m		
Select rooms			**Area**		**Height**		
Kitchen	No.	1					
Utility room	No.	1					
Bathroom/Ensuite (1)	No.	1					
Sanitary accommodation (no bath or shower) (1)	No.	1					
	No.						
	No.						
	No.						
Living room (1)	No.	1	18	m²	2.4	m	
Dining room	No.	1	25	m²	2.4	m	
Playroom	No.			m²		m	
Study room	No.			m²		m	
Reception room	No.			m²		m	
Bedroom 1	No.	1	20	m²	2.4	m	
Bedroom 2	No.	1	16	m²	2.4	m	
Bedroom 3	No.	1	12	m²	2.4	m	
Bedroom 4	No.			m²		m	
Bedroom 5	No.			m²		m	
Bedroom 6	No.			m²		m	
	No.			m²		m	
	No.			m²		m	
	No.			m²		m	

Step 1 - General ventilation rate

Calculated general ventilation rate based on occupancy of the dwelling [TGD F – 1.2.3.2]:			Calculated general ventilation rate based on internal floor area of the dwelling [TGD F – 1.2.3.2]:
5 l/s plus 4 l/s x Persons			Floor Area m² at 0.3 l/s/m²
Persons =	5		
5 l/s + (4 l/s x Persons) =	25	l/s	39.00 l/s
(Assume 2 people in main bedroom and second bedroom and 1 person in third bedroom)			

General ventilation rate of the dwelling is the greater of the above = 39.00 l/s

General continuous supply ventilation rate of the dwelling is = 39.00 l/s

General continuous extract ventilation rate of the dwelling is = 39.00 l/s

Step 2 – Overall minimum boost extract ventilation rate

Overall minimum boost extract ventilation rate requirement [TGD F - Table 2]:

Kitchen	1	x	13	=	13
Utility room	1	x	8	=	8
Bathroom/Ensuite (1)	1	x	8	=	8
Sanitary accommodation (no bath or shower) (1)	1	x	6	=	6
	0	x	0	=	0
	0	x	0	=	0
	0	x	0	=	0
					35.0 l/s

Step 3 – Ventilation system capacity

25% capacity requirement over general ventilation rate of the dwelling [TGD F - 1.2.3.4]:

Greater of overall minimum boost extract rate and (General ventilation rate * 1.25) = 48.8 l/s

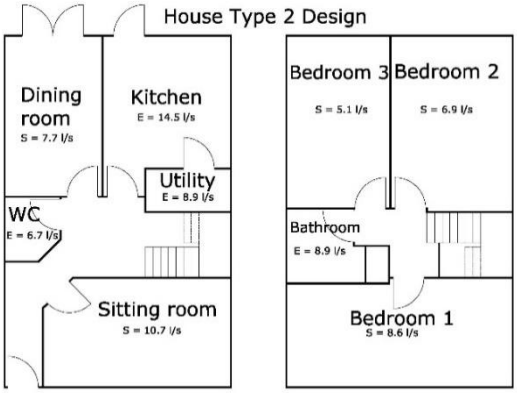
The total capacity of the ventilation system required is = 48.8 l/s

This is the total capacity of the ventilation system that is required.

The total supply airflow rate of 39 l/s must be delivered to the habitable rooms in proportion to their volume. In this example the general ventilation rate > Overall minimum boost extract ventilation rate.

Extract should be from each wet room and sanitary accommodation. The boost rate at each individual extract point shall be no less than TGD F Table 2 and need to be increased to achieve the general ventilation rate of 39 l/s.

Recirculation by the system of moist air from the wet rooms to the habitable rooms should be avoided.



Room with MVHR supply terminal(s)	Room area (m^2)	Room volume (m^3)	Room general supply airflow rate (l/s)		
			Supply	% Vol	Total
Living room (1)	18	43.2	39.00	19.8%	7.7 l/s
Dining room	25	60.0	39.00	27.5%	10.7 l/s
Playroom					
Study room					
Reception room					
Bedroom 1	20	48.0	39.00	22.0%	8.6 l/s
Bedroom 2	16	38.4	39.00	17.6%	6.9 l/s
Bedroom 3	12	28.8	39.00	13.2%	5.1 l/s
Bedroom 4					
Bedroom 5					
Bedroom 6					
Total	91.00	218.4	Σ Balance check =		39.00 l/s

Room with MEV/MVHR extract terminal(s)	General Room extract airflow rate (l/s)				
	Extract	% Ext	Per Room	No.	Total
Kitchen	39.0	37%	14.5 l/s	x 1.0	14.5 l/s
Utility room	39.0	23%	8.9 l/s	x 1.0	8.9 l/s
Bathroom/Ensuite (1)	39.0	23%	8.9 l/s	x 1.0	8.9 l/s
Sanitary accommodation (no bath or shower) (1)	39.0	17%	6.7 l/s	x 1.0	6.7 l/s
		100%	Σ Balance check =		39.00 l/s

Room with MVHR supply terminal(s)	Room area (m^2)	Room volume (m^3)	Room Minimum Boost supply airflow rate (l/s)		
			Supply	% Vol	Total
Living room (1)	18	43.2	39.00	19.8%	7.7 l/s
Dining room	25	60.0	39.00	27.5%	10.7 l/s
Playroom					
Study room					
Reception room					
Bedroom 1	20	48.0	39.00	22.0%	8.6 l/s
Bedroom 2	16	38.4	39.00	17.6%	6.9 l/s
Bedroom 3	12	28.8	39.00	13.2%	5.1 l/s
Bedroom 4					
Bedroom 5					
Bedroom 6					
Total	91	218.4	Σ Balance check =		39.00 l/s

Room with MEV/MVHR extract terminal(s)	Room Minimum Boost extract airflow rate (l/s)				
	Extract	% Ext	Per Room	No.	Total
Kitchen	39.00	37%	14.5 l/s	x 1.0	14.5 l/s
Utility room	39.00	23%	8.9 l/s	x 1.0	8.9 l/s
Bathroom/Ensuite (1)	39.00	23%	8.9 l/s	x 1.0	8.9 l/s
Sanitary accommodation (no bath or shower) (1)	39.00	17%	6.7 l/s	x 1.0	6.7 l/s
		100%	Σ Balance check =		39.00 l/s

6.3 **Example 3 - Semi-detached 80m²**

Ventilation design sheet

Dwelling address		**Example 3**					
Dwelling type		**Semi-detached house**					
Total floor area					80.0	m²	
Ventilation system		Centralised Supply & Extract Mechanical Ventilation					
Date of test							
Installer/builder (if applicable)							
Validation certificate number		1.91.0xx.21.001					
Air permeability <					5	m³/(h.m	
Select rooms			**Area**		**Height**		
Kitchen	No.	1					
Utility room	No.						
Bathroom/Ensuite (1)	No.	1					
Sanitary accommodation (no bath or shower) (1)	No.						
	No.						
	No.						
	No.						
Living room (1)	No.	1	20	m²	2.4	m	
Dining room	No.			m²		m	
Playroom	No.			m²		m	
Study room	No.			m²		m	
Reception room	No.			m²		m	
Bedroom 1	No.	1	20	m²	2.4	m	
Bedroom 2	No.	1	16	m²	2.4	m	
Bedroom 3	No.			m²		m	
Bedroom 4	No.			m²		m	
Bedroom 5	No.			m²		m	
Bedroom 6	No.			m²		m	
	No.			m²		m	
	No.			m²		m	
	No.			m²		m	

Step 1 - General ventilation rate

Calculated general ventilation rate based on occupancy of the dwelling [TGD F – 1.2.3.2]:			Calculated general ventilation rate based on internal floor area of the dwelling [TGD F – 1.2.3.2]:	
5 l/s plus 4 l/s x Persons			Floor Area m² at 0.3 l/s/m²	
Persons =	4			
5 l/s + (4 l/s x Persons) =	21	l/s	24.00	l/s
(Assume 2 people in main bedroom and second bedroom)				

General ventilation rate of the dwelling is the greater of the above =	24.00 l/s
General continuous supply ventilation rate of the dwelling is =	24.00 l/s
General continuous extract ventilation rate of the dwelling is =	24.00 l/s

Step 2 – Overall minimum boost extract ventilation rate

Overall minimum boost extract ventilation rate requirement [TGD F - Table 2]:

Kitchen	1	x	13	=	13
Utility room	0	x	8	=	0
Bathroom/Ensuite (1)	1	x	8	=	8
Sanitary accommodation (no bath or shower) (1)	0	x	6	=	0
	0	x	0	=	0
	0	x	0	=	0
	0	x	0	=	0
					21.0 l/s

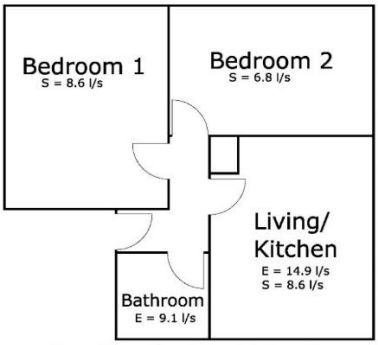
Step 3 – Ventilation system capacity

25% capacity requirement over general ventilation rate of the dwelling [TGD F - 1.2.3.4]:	
Greater of overall minimum boost extract rate and (General ventilation rate * 1.25) =	30.0 l/s
The total capacity of the ventilation system required is =	30.0 l/s
This is the total capacity of the ventilation system that is required.	

The total supply airflow rate of 24 l/s must be delivered to the habitable rooms in proportion to their volume. In this example the general ventilation rate > Overall minimum boost extract ventilation rate.

Extract should be from each wet room and sanitary accommodation. The boost rate at each individual extract point shall be no less than TGD F Table 2 and need to be increased to achieve the general ventilation rate of 24 l/s.

Recirculation by the system of moist air from the wet rooms to the habitable rooms should be avoided.



S = Supply, E = Extract

Room with MVHR supply terminal(s)	Room area (m^2)	Room volume (m^3)	Room general supply airflow rate (l/s)		
			Supply	% Vol	Total
Living room (1)	20	48.0	24.00	35.7%	8.6 l/s
Dining room					
Playroom					
Study room					
Reception room					
Bedroom 1	20	48.0	24.00	35.7%	8.6 l/s
Bedroom 2	16	38.4	24.00	28.6%	6.9 l/s
Bedroom 3					
Bedroom 4					
Bedroom 5					
Bedroom 6					
Total	56.00	134.4	Σ Balance check =		24.0 l/s

Room with MEV/MVHR extract terminal(s)	General Room extract airflow rate (l/s)				
	Extract	% Ext	Per Room	No.	Total
Kitchen	24.0	62%	14.9 l/s	x 1.0	14.9 l/s
Utility room				x 0.0	
Bathroom/Ensuite (1)	24.0	38%	9.1 l/s	x 1.0	9.1 l/s
Sanitary accommodation (no bath or shower) (1)				x 0.0	
		100%	Σ Balance check =		24.0 l/s

Room with MVHR supply terminal(s)	Room area (m^2)	Room volume (m^3)	Room Minimum Boost supply airflow rate (l/s)		
			Supply	% Vol	Total
Living room (1)	20	48.0	24.00	35.7%	8.6 l/s
Dining room					
Playroom					
Study room					
Reception room					
Bedroom 1	20	48.0	24.00	35.7%	8.6 l/s
Bedroom 2	16	38.4	24.00	28.6%	6.9 l/s
Bedroom 3					
Bedroom 4					
Bedroom 5					
Bedroom 6					
Total	56	134.4	Σ Balance check =		24.0 l/s

Room with MEV/MVHR extract terminal(s)	Room Minimum Boost extract airflow rate (l/s)				
	Extract	% Ext	Per Room	No.	Total
Kitchen	24.00	62%	14.9 l/s	x 1.0	14.9 l/s
Utility room				x 0.0	
Bathroom/Ensuite (1)	24.00	38%	9.1 l/s	x 1.0	9.1 l/s
Sanitary accommodation (no bath or shower) (1)				x 0.0	
		100%	Σ Balance check =		24.0 l/s

6.4 Example 4 - Natural ventilation

Background ventilation for 130m² Two-Storey Semi-detached House, Air Permeability <5m³/(h.m²)

3 Bedrooms, 1 bathroom, 1 Utility, 1 Sitting room, 1 Kitchen, 1 Dining room, 1 Downstairs WC, 1 Internal Ensuite

Whole house ventilation rate = 42,000mm² + 7,000mm per 10m²>70m² 130m²-70m²=60m². Therefore, whole house background equivalent[1] area reqd. = 42,000+ (6 x 7,000) =84,000mm².

Similar equivalent areas of vents should be distributed on opposite sides of the dwelling to maximize cross ventilation.

For example, this can be distributed through house as follows:
Habitable rooms= 5 x 10,000 mm²
Bathroom, Utility, Kitchen, Downstairs WC= 4 x 8,500 mm

Note 1: As noted in Paragraph 1.1.15, the areas specified in the example above should increase by 25% where free area of ventilators is used instead of equivalent area.

Back to Top

6.5 Example 5 - Apartment 48m²

Ventilation design sheet

Dwelling address		**Example 5**					
Dwelling type		**Apartment**					
Total floor area					48.0	m²	
Ventilation system		Centralised Supply & Extract Mechanical Ventilation					
Date of test							
Installer/builder (if applicable)							
Validation certificate number		1.91.0xx.21.001					
Air permeability <					5	m³/(h.m	
Select rooms			**Area**		**Height**		
Kitchen	No.	1					
Utility room	No.						
Bathroom/Ensuite (1)	No.	1					
Sanitary accommodation (no bath or shower) (1)	No.						
	No.						
	No.						
	No.						
Living room (1)	No.	1	26.8	m²	2.4	m	
Dining room	No.			m²		m	
Playroom	No.			m²		m	
Study room	No.			m²		m	
Reception room	No.			m²		m	
Bedroom 1	No.	1	9.6	m²	2.4	m	
Bedroom 2	No.	1	6.9	m²	2.4	m	
Bedroom 3	No.			m²		m	
Bedroom 4	No.			m²		m	
Bedroom 5	No.			m²		m	
Bedroom 6	No.			m²		m	
	No.			m²		m	
	No.			m²		m	
	No.			m²		m	

Step 1 - General ventilation rate

Calculated general ventilation rate based on occupancy of the dwelling [TGD F – 1.2.3.2]:		Calculated general ventilation rate based on internal floor area of the dwelling [TGD F – 1.2.3.2]:
5 l/s plus 4 l/s x Persons		Floor Area m² at 0.3 l/s/m²
Persons =	4	
5 l/s + (4 l/s x Persons) =	21.0 l/s	14.4 l/s
(Assume 2 people in main bedroom and second bedroom)		

General ventilation rate of the dwelling is the greater of the above = 21.0 l/s

General continuous supply ventilation rate of the dwelling is = 21.0 l/s

General continuous extract ventilation rate of the dwelling is = 21.0 l/s

Step 2 – Overall minimum boost extract ventilation rate

Overall minimum boost extract ventilation rate requirement [TGD F - Table 2]:

Kitchen	1	x	13	=	13
Utility room	0	x	8	=	0
Bathroom/Ensuite (1)	1	x	8	=	8
Sanitary accommodation (no bath or shower) (1)	0	x	6	=	0
	0	x	0	=	0
	0	x	0	=	0
	0	x	0	=	0
					21.0 l/s

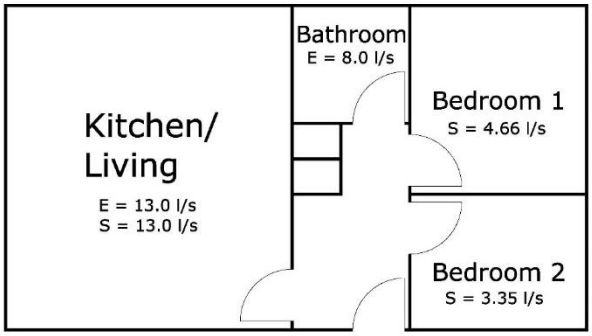
Step 3 – Ventilation system capacity

25% capacity requirement over general ventilation rate of the dwelling [TGD F - 1.2.3.4]:

Greater of overall minimum boost extract rate and (General ventilation rate * 1.25) = 26.3 l/s

The total capacity of the ventilation system required is = 26.3 l/s

This is the total capacity of the ventilation system that is required.



Room with MVHR supply terminal(s)	Room area (m^2)	Room volume (m^3)	Room general supply airflow rate (l/s)		
			Supply	% Vol	Total
Living room (1)	26.8	64.3	21.00	61.9%	13.0 l/s
Dining room					
Playroom					
Study room					
Reception room					
Bedroom 1	9.6	23.0	21.00	22.2%	4.7 l/s
Bedroom 2	6.9	16.6	21.00	15.9%	3.3 l/s
Bedroom 3					
Bedroom 4					
Bedroom 5					
Bedroom 6					
Total	43.30	103.9	Σ Balance check =		21.0 l/s

Room with MEV/MVHR extract terminal(s)	General Room extract airflow rate (l/s)				
	Extract	% Ext	Per Room	No.	Total
Kitchen	21.0	62%	13.0 l/s	x 1.0	13.0 l/s
Utility room				x 0.0	
Bathroom/Ensuite (1)	21.0	38%	8.0 l/s	x 1.0	8.0 l/s
Sanitary accommodation (no bath or shower) (1)				x 0.0	
		100%	Σ Balance check =		21.0 l/s

Room with MVHR supply terminal(s)	Room area (m^2)	Room volume (m^3)	Room Minimum Boost supply airflow rate (l/s)		
			Supply	% Vol	Total
Living room (1)	26.8	64.3	21.00	61.9%	13.0 l/s
Dining room					
Playroom					
Study room					
Reception room					
Bedroom 1	9.6	23.0	21.00	22.2%	4.7 l/s
Bedroom 2	6.9	16.6	21.00	15.9%	3.3 l/s
Bedroom 3					
Bedroom 4					
Bedroom 5					
Bedroom 6					
Total	43.3	103.9	Σ Balance check =		21.0 l/s

Room with MEV/MVHR extract terminal(s)	Room Minimum Boost extract airflow rate (l/s)				
	Extract	% Ext	Per Room	No.	Total
Kitchen	21.00	62%	13.0 l/s	x 1.0	13.0 l/s
Utility room				x 0.0	
Bathroom/Ensuite (1)	21.00	38%	8.0 l/s	x 1.0	8.0 l/s
Sanitary accommodation (no bath or shower) (1)				x 0.0	
		100%	Σ Balance check =		21.0 l/s

6.6 **Example 6 - Semi Detached 77m²**

Ventilation design sheet

Dwelling address	**Example 6**
Dwelling type	**Semi-detached house**
Total floor area	77.0 m^2
Ventilation system	Centralised Supply & Extract Mechanical Ventilation
Date of test	
Installer/builder (if applicable)	
Validation certificate number	1.91.0xx.21.001
Air permeability <	5 $m^3/(h.m$

Select rooms			**Area**		**Height**	
Kitchen	No.	1				
Utility room	No.					
Bathroom/Ensuite (1)	No.	1				
Sanitary accommodation (no bath or shower) (1)	No.					
	No.					
	No.					
	No.					
Living room (1)	No.	1	26.8	m^2	2.4	m
Dining room	No.			m^2		m
Playroom	No.			m^2		m
Study room	No.			m^2		m
Reception room	No.			m^2		m
Bedroom 1	No.	1	11.5	m^2	2.4	m
Bedroom 2	No.	1	11.2	m^2	2.4	m
Bedroom 3	No.			m^2		m
Bedroom 4	No.			m^2		m
Bedroom 5	No.			m^2		m
Bedroom 6	No.			m^2		m
	No.			m^2		m
	No.			m^2		m
	No.			m^2		m

Step 1 - General ventilation rate

Calculated general ventilation rate based on occupancy of the dwelling [TGD F – 1.2.3.2]:		Calculated general ventilation rate based on internal floor area of the dwelling [TGD F – 1.2.3.2]:
5 l/s plus 4 l/s x Persons		Floor Area m^2 at 0.3 l/s/m^2
Persons =	4	
5 l/s + (4 l/s x Persons) =	21.0 l/s	23.1 l/s
(Assume 2 people in main bedroom and second bedroom)		

General ventilation rate of the dwelling is the greater of the above = 23.1 l/s

General continuous supply ventilation rate of the dwelling is = 23.1 l/s

General continuous extract ventilation rate of the dwelling is = 23.1 l/s

Step 2 – Overall minimum boost extract ventilation rate

Overall minimum boost extract ventilation rate requirement [TGD F - Table 2]:

Kitchen	1	x	13	=	13
Utility room	0	x	8	=	0
Bathroom/Ensuite (1)	1	x	8	=	8
Sanitary accommodation (no bath or shower) (1)	0	x	6	=	0
	0	x	0	=	0
	0	x	0	=	0
	0	x	0	=	0
					21.0 l/s

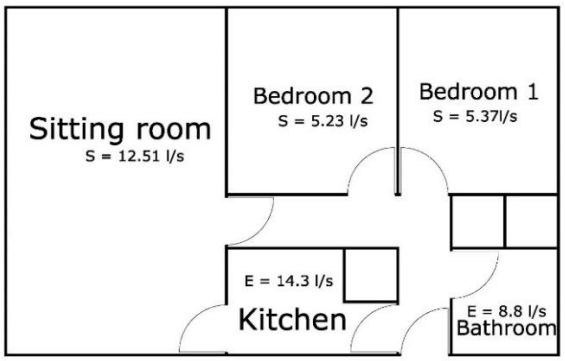
Step 3 – Ventilation system capacity

25% capacity requirement over general ventilation rate of the dwelling [TGD F - 1.2.3.4]:

Greater of overall minimum boost extract rate and (General ventilation rate * 1.25) = 28.9 l/s

The total capacity of the ventilation system required is = 28.9 l/s

This is the total capacity of the ventilation system that is required.



Room with MVHR supply terminal(s)	Room area (m^2)	Room volume (m^3)	Room general supply airflow rate (l/s)		
			Supply	% Vol	Total
Living room (1)	26.8	64.3	23.10	54.1%	12.5 l/s
Dining room					
Playroom					
Study room					
Reception room					
Bedroom 1	11.5	27.6	23.10	23.2%	5.4 l/s
Bedroom 2	11.2	26.9	23.10	22.6%	5.2 l/s
Bedroom 3					
Bedroom 4					
Bedroom 5					
Bedroom 6					
Total	49.50	118.8	Σ Balance check =		23.1 l/s

Room with MEV/MVHR extract terminal(s)	General Room extract airflow rate (l/s)				
	Extract	% Ext	Per Room	No.	Total
Kitchen	23.1	62%	14.3 l/s	x 1.0	14.3 l/s
Utility room				x 0.0	
Bathroom/Ensuite (1)	23.1	38%	8.8 l/s	x 1.0	8.8 l/s
Sanitary accommodation (no bath or shower) (1)				x 0.0	
		100%	Σ Balance check =		23.1 l/s

Room with MVHR supply terminal(s)	Room area (m^2)	Room volume (m^3)	Room Minimum Boost supply airflow rate (l/s)		
			Supply	% Vol	Total
Living room (1)	26.8	64.3	23.10	54.1%	12.5 l/s
Dining room					
Playroom					
Study room					
Reception room					
Bedroom 1	11.5	27.6	23.10	23.2%	5.4 l/s
Bedroom 2	11.2	26.9	23.10	22.6%	5.2 l/s
Bedroom 3					
Bedroom 4					
Bedroom 5					
Bedroom 6					
Total	49.5	118.8	Σ Balance check =		23.1 l/s

Room with MEV/MVHR extract terminal(s)	Room Minimum Boost extract airflow rate (l/s)				
	Extract	% Ext	Per Room	No.	Total
Kitchen	23.10	62%	14.3 l/s	x 1.0	14.3 l/s
Utility room				x 0.0	
Bathroom/Ensuite (1)	23.10	38%	8.8 l/s	x 1.0	8.8 l/s
Sanitary accommodation (no bath or shower) (1)				x 0.0	
		100%	Σ Balance check =		23.1 l/s

6.7 **Example 7 - Detached 202m²**

Ventilation design sheet

Dwelling address	**Example 7**
Dwelling type	**Detached house**
Total floor area	202.0 m^2
Ventilation system	Centralised Supply & Extract Mechanical Ventilation
Date of test	
Installer/builder (if applicable)	
Validation certificate number	1.91.0xx.21.001
Air permeability <	5 $m^3/(h.m$

Select rooms			**Area**		**Height**	
Kitchen	No.	1				
Utility room	No.	1				
Bathroom/Ensuite (1)	No.	1				
Sanitary accommodation (no bath or shower) (1)	No.	1				
Bathroom/Ensuite (2)	No.	1				
Bathroom/Ensuite (3)	No.	1				
Bathroom/Ensuite (4)	No.	1				
Living room (1)	No.	1	18	m^2	2.4	m
Dining room	No.	1	20	m^2	2.4	m
Playroom	No.			m^2		m
Study room	No.			m^2		m
Reception room	No.			m^2		m
Bedroom 1	No.	1	21	m^2	2.4	m
Bedroom 2	No.	1	11.7	m^2	2.4	m
Bedroom 3	No.	1	21	m^2	2.4	m
Bedroom 4	No.	1	13	m^2	2.4	m
Bedroom 5	No.			m^2		m
Bedroom 6	No.			m^2		m
Living Room (2)	No.	1	12	m^2	2.4	m
	No.			m^2		m
	No.			m^2		m

Step 1 - General ventilation rate

Calculated general ventilation rate based on occupancy of the dwelling [TGD F – 1.2.3.2]:		Calculated general ventilation rate based on internal floor area of the dwelling [TGD F – 1.2.3.2]:
5 l/s plus 4 l/s x Persons		Floor Area m^2 at 0.3 l/s/m^2
Persons =	7	
5 l/s + (4 l/s x Persons) =	33.0 l/s	60.6 l/s
(Assume 2 people in main bedroom and second bedroom and 1 person in every additional bedroom)		

General ventilation rate of the dwelling is the greater of the above = 60.6 l/s

General continuous supply ventilation rate of the dwelling is = 60.6 l/s

General continuous extract ventilation rate of the dwelling is = 60.6 l/s

Step 2 – Overall minimum boost extract ventilation rate

Overall minimum boost extract ventilation rate requirement [TGD F - Table 2]:

Kitchen	1	x	13	=	13
Utility room	1	x	8	=	8
Bathroom/Ensuite (1)	1	x	8	=	8
Sanitary accommodation (no bath or shower) (1)	1	x	6	=	6
Bathroom/Ensuite (2)	1	x	8	=	8
Bathroom/Ensuite (3)	1	x	8	=	8
Bathroom/Ensuite (4)	1	x	8	=	8
					59.0 l/s

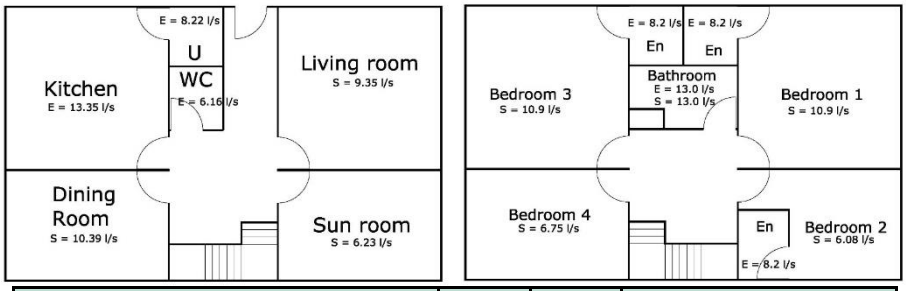
Step 3 – Ventilation system capacity

25% capacity requirement over general ventilation rate of the dwelling [TGD F - 1.2.3.4]:

Greater of overall minimum boost extract rate and (General ventilation rate * 1.25) = 75.8 l/s

The total capacity of the ventilation system required is = 75.8 l/s

This is the total capacity of the ventilation system that is required.



Room with MVHR supply terminal(s)	Room area (m^2)	Room volume (m^3)	Room general supply airflow rate (l/s)		
			Supply	% Vol	Total
Living room (1)	18	43.2	60.60	15.4%	9.3 l/s
Dining room	20	48.0	60.60	17.1%	10.4 l/s
Playroom					
Study room					
Reception room					
Bedroom 1	21	50.4	60.60	18.0%	10.9 l/s
Bedroom 2	11.7	28.1	60.60	10.0%	6.1 l/s
Bedroom 3	21	50.4	60.60	18.0%	10.9 l/s
Bedroom 4	13	31.2	60.60	11.1%	6.8 l/s
Bedroom 5					
Bedroom 6					
Living Room (2)	12	28.8	60.60	10.3%	6.2 l/s
Total	116.70	280.1	Σ Balance check =		60.6 l/s

Room with MEV/MVHR extract terminal(s)	General Room extract airflow rate (l/s)				
	Extract	% Ext	Per Room	No.	Total
Kitchen	60.6	22%	13.4 l/s	x 1.0	13.4 l/s
Utility room	60.6	14%	8.2 l/s	x 1.0	8.2 l/s
Bathroom/Ensuite (1)	60.6	14%	8.2 l/s	x 1.0	8.2 l/s
Sanitary accommodation (no bath or shower) (1)	60.6	10%	6.2 l/s	x 1.0	6.2 l/s
Bathroom/Ensuite (2)	60.6	14%	8.2 l/s	x 1.0	8.2 l/s
Bathroom/Ensuite (3)	60.6	14%	8.2 l/s	x 1.0	8.2 l/s
Bathroom/Ensuite (4)	60.60	14%	8.2 l/s	x 1.0	8.2 l/s
		100%	Σ Balance check =		60.6 l/s

Room with MVHR supply terminal(s)	Room area (m^2)	Room volume (m^3)	Room Minimum Boost supply airflow rate (l/s)		
			Supply	% Vol	Total
Living room (1)	18	43.2	60.60	15.4%	9.3 l/s
Dining room	20	48.0	60.60	17.1%	10.4 l/s
Playroom					
Study room					
Reception room					
Bedroom 1	21	50.4	60.60	18.0%	10.9 l/s
Bedroom 2	11.7	28.1	60.60	10.0%	6.1 l/s
Bedroom 3	21	50.4	60.60	18.0%	10.9 l/s
Bedroom 4	13	31.2	60.60	11.1%	6.8 l/s
Bedroom 5					
Bedroom 6					
Living Room (2)	12	28.8	60.60	10.3%	6.2 l/s
Total	116.7	280.1	Σ Balance check =		60.6 l/s

Room with MEV/MVHR extract terminal(s)	Room Minimum Boost extract airflow rate (l/s)				
	Extract	% Ext	Per Room	No.	Total
Kitchen	60.60	22%	13.4 l/s	x 1.0	13.4 l/s
Utility room	60.60	14%	8.2 l/s	x 1.0	8.2 l/s
Bathroom/Ensuite (1)	60.60	14%	8.2 l/s	x 1.0	8.2 l/s
Sanitary accommodation (no bath or shower) (1)	60.60	10%	6.2 l/s	x 1.0	6.2 l/s
Bathroom/Ensuite (2)	60.60	14%	8.2 l/s	x 1.0	8.2 l/s
Bathroom/Ensuite (3)	60.60	14%	8.2 l/s	x 1.0	8.2 l/s
Bathroom/Ensuite (4)	60.60	14%	8.2 l/s	x 1.0	8.2 l/s
		100%	Σ Balance check =		60.6 l/s

6.8 Example 8 - Semi Detached 82m²

Ventilation design sheet

Dwelling address			**Example 8**				
Dwelling type			**Semi-detached house**				
Total floor area						82.0	m²
Ventilation system			Centralised Supply & Extract Mechanical Ventilation				
Date of test							
Installer/builder (if applicable)							
Validation certificate number			1.91.0xx.21.001				
Air permeability <			5	m³/(h.m			
Select rooms				**Area**		**Height**	
Kitchen	No.	1					
Utility room	No.						
Bathroom/Ensuite (1)	No.	1					
Sanitary accommodation (no bath or shower) (1)	No.						
	No.						
	No.						
	No.						
Living room (1)	No.	1	15	m²		2.4	m
Dining room	No.	1	10	m²		2.4	m
Playroom	No.			m²			m
Study room	No.			m²			m
Reception room	No.			m²			m
Bedroom 1	No.	1	20	m²		2.4	m
Bedroom 2	No.	1	14	m²		2.4	m
Bedroom 3	No.	1	7	m²		2.4	m
Bedroom 4	No.			m²			m
Bedroom 5	No.			m²			m
Bedroom 6	No.			m²			m
	No.			m²			m
	No.			m²			m
	No.			m²			m

Step 1 - General ventilation rate

Calculated general ventilation rate based on occupancy of the dwelling [TGD F – 1.2.3.2]:		Calculated general ventilation rate based on internal floor area of the dwelling [TGD F – 1.2.3.2]:
5 l/s plus 4 l/s x Persons		Floor Area m² at 0.3 l/s/m²
Persons =	5	
5 l/s + (4 l/s x Persons) =	25.0 l/s	24.6 l/s
(Assume 2 people in main bedroom and second bedroom and 1 person in third bedroom)		

General ventilation rate of the dwelling is the greater of the above = 25.0 l/s

General continuous supply ventilation rate of the dwelling is = 25.0 l/s

General continuous extract ventilation rate of the dwelling is = 25.0 l/s

Step 2 – Overall minimum boost extract ventilation rate

Overall minimum boost extract ventilation rate requirement [TGD F - Table 2]:

Kitchen	1	x	13	=	13
Utility room	0	x	8	=	0
Bathroom/Ensuite (1)	1	x	8	=	8
Sanitary accommodation (no bath or shower) (1)	0	x	6	=	0
	0	x	0	=	0
	0	x	0	=	0
	0	x	0	=	0
					21.0 l/s

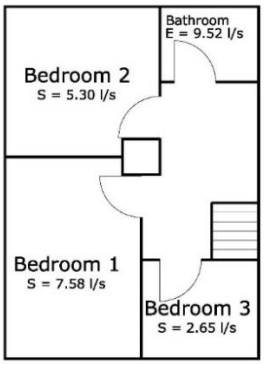
Step 3 – Ventilation system capacity

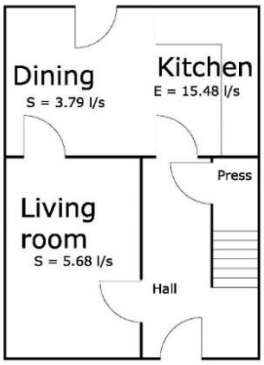
25% capacity requirement over general ventilation rate of the dwelling [TGD F - 1.2.3.4]:

Greater of overall minimum boost extract rate and (General ventilation rate * 1.25) = 31.3 l/s

The total capacity of the ventilation system required is = 31.3 l/s

This is the total capacity of the ventilation system that is required.





Room with MVHR supply terminal(s)	Room area (m^2)	Room volume (m^3)	Room general supply airflow rate (l/s)		
			Supply	% Vol	Total
Living room (1)	15	36.0	25.00	22.7%	5.7 l/s
Dining room	10	24.0	25.00	15.2%	3.8 l/s
Playroom					
Study room					
Reception room					
Bedroom 1	20	48.0	25.00	30.3%	7.6 l/s
Bedroom 2	14	33.6	25.00	21.2%	5.3 l/s
Bedroom 3	7	16.8	25.00	10.6%	2.7 l/s
Bedroom 4					
Bedroom 5					
Bedroom 6					
Total	66.00	158.4	Σ Balance check =		25.0 l/s

Room with MEV/MVHR extract terminal(s)	General Room extract airflow rate (l/s)				
	Extract	% Ext	Per Room	No.	Total
Kitchen	25.0	62%	15.5 l/s	x 1.0	15.5 l/s
Utility room				x 0.0	
Bathroom/Ensuite (1)	25.0	38%	9.5 l/s	x 1.0	9.5 l/s
Sanitary accommodation (no bath or shower) (1)				x 0.0	
		100%	Σ Balance check =		25.0 l/s

Room with MVHR supply terminal(s)	Room area (m^2)	Room volume (m^3)	Room Minimum Boost supply airflow rate (l/s)		
			Supply	% Vol	Total
Living room (1)	15	36.0	25.00	22.7%	5.7 l/s
Dining room	10	24.0	25.00	15.2%	3.8 l/s
Playroom					
Study room					
Reception room					
Bedroom 1	20	48.0	25.00	30.3%	7.6 l/s
Bedroom 2	14	33.6	25.00	21.2%	5.3 l/s
Bedroom 3	7	16.8	25.00	10.6%	2.7 l/s
Bedroom 4					
Bedroom 5					
Bedroom 6					
Total	66	158.4	Σ Balance check =		25.0 l/s

Room with MEV/MVHR extract terminal(s)	Room Minimum Boost extract airflow rate (l/s)				
	Extract	% Ext	Per Room	No.	Total
Kitchen	25.00	62%	15.5 l/s	x 1.0	15.5 l/s
Utility room				x 0.0	
Bathroom/Ensuite (1)	25.00	38%	9.5 l/s	x 1.0	9.5 l/s
Sanitary accommodation (no bath or shower) (1)				x 0.0	
		100%	Σ Balance check =		25.0 l/s

6.9 **Example 9 - Semi Detached 122m²**

Ventilation design sheet

Dwelling address	**Example 9**
Dwelling type	**Semi-detached house**
Total floor area	122.0 m^2
Ventilation system	Centralised Supply & Extract Mechanical Ventilation
Date of test	
Installer/builder (if applicable)	
Validation certificate number	1.91.0xx.21.001
Air permeability <	5 $m^3/(h.m$

Select rooms			**Area**		**Height**	
Kitchen	No.	1				
Utility room	No.	1				
Bathroom/Ensuite (1)	No.	1				
Sanitary accommodation (no bath or shower) (1)	No.	1				
Bathroom/Ensuite (2)	No.	1				
	No.					
	No.					
Living room (1)	No.	1	24	m^2	2.4	m
Dining room	No.	1	10	m^2	2.4	m
Playroom	No.			m^2		m
Study room	No.			m^2		m
Reception room	No.			m^2		m
Bedroom 1	No.	1	14	m^2	2.4	m
Bedroom 2	No.	1	16.4	m^2	2.4	m
Bedroom 3	No.	1	9.3	m^2	2.4	m
Bedroom 4	No.			m^2		m
Bedroom 5	No.			m^2		m
Bedroom 6	No.			m^2		m
	No.			m^2		m
	No.			m^2		m
	No.			m^2		m

Step 1 - General ventilation rate

Calculated general ventilation rate based on occupancy of the dwelling [TGD F – 1.2.3.2]:		Calculated general ventilation rate based on internal floor area of the dwelling [TGD F – 1.2.3.2]:
5 l/s plus 4 l/s x Persons		Floor Area m^2 at 0.3 l/s/m^2
Persons =	5	
5 l/s + (4 l/s x Persons) =	25.0 l/s	36.6 l/s
(Assume 2 people in main bedroom and second bedroom and 1 person in third bedroom)		

General ventilation rate of the dwelling is the greater of the above = 36.6 l/s

General continuous supply ventilation rate of the dwelling is = 36.6 l/s

General continuous extract ventilation rate of the dwelling is = 36.6 l/s

Step 2 – Overall minimum boost extract ventilation rate

Overall minimum boost extract ventilation rate requirement [TGD F - Table 2]:

Kitchen	1	x	13	=	13
Utility room	1	x	8	=	8
Bathroom/Ensuite (1)	1	x	8	=	8
Sanitary accommodation (no bath or shower) (1)	1	x	6	=	6
Bathroom/Ensuite (2)	1	x	8	=	8
	0	x	0	=	0
	0	x	0	=	0
					43.0 l/s

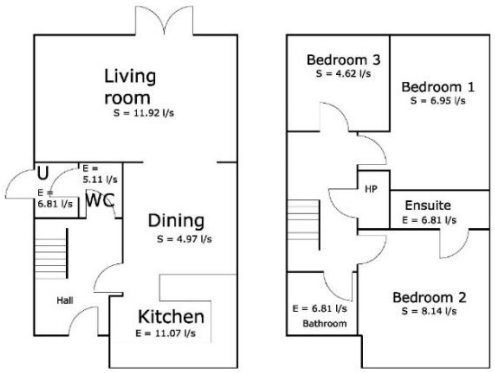
Step 3 – Ventilation system capacity

25% capacity requirement over general ventilation rate of the dwelling [TGD F - 1.2.3.4]:

Greater of overall minimum boost extract rate and (General ventilation rate * 1.25) = 45.8 l/s

The total capacity of the ventilation system required is = 45.8 l/s

This is the total capacity of the ventilation system that is required.



Room with MVHR supply terminal(s)	Room area (m^2)	Room volume (m^3)	Room general supply airflow rate (l/s)		
			Supply	% Vol	Total
Living room (1)	24	57.6	36.60	32.6%	11.9 l/s
Dining room	10	24.0	36.60	13.6%	5.0 l/s
Playroom					
Study room					
Reception room					
Bedroom 1	14	33.6	36.60	19.0%	7.0 l/s
Bedroom 2	16.4	39.4	36.60	22.3%	8.1 l/s
Bedroom 3	9.3	22.3	36.60	12.6%	4.6 l/s
Bedroom 4					
Bedroom 5					
Bedroom 6					
Total	73.70	176.9	Σ Balance check =		36.6 l/s

Room with MEV/MVHR extract terminal(s)	General Room extract airflow rate (l/s)				
	Extract	% Ext	Per Room	No.	Total
Kitchen	36.6	30%	11.1 l/s	x 1.0	11.1 l/s
Utility room	36.6	19%	6.8 l/s	x 1.0	6.8 l/s
Bathroom/Ensuite (1)	36.6	19%	6.8 l/s	x 1.0	6.8 l/s
Sanitary accommodation (no bath or shower) (1)	36.6	14%	5.1 l/s	x 1.0	5.1 l/s
Bathroom/Ensuite (2)	36.6	19%	6.8 l/s	x 1.0	6.8 l/s
		100%	Σ Balance check =		36.6 l/s

Room with MVHR supply terminal(s)	Room area (m^2)	Room volume (m^3)	Room Minimum Boost supply airflow rate (l/s)		
			Supply	% Vol	Total
Living room (1)	24	57.6	43.00	32.6%	14.0 l/s
Dining room	10	24.0	43.00	13.6%	5.8 l/s
Playroom					
Study room					
Reception room					
Bedroom 1	14	33.6	43.00	19.0%	8.2 l/s
Bedroom 2	16.4	39.4	43.00	22.3%	9.6 l/s
Bedroom 3	9.3	22.3	43.00	12.6%	5.4 l/s
Bedroom 4					
Bedroom 5					
Bedroom 6					
Total	73.7	176.9	Σ Balance check =		43.0 l/s

Room with MEV/MVHR extract terminal(s)	Room Minimum Boost extract airflow rate (l/s)				
	Extract	% Ext	Per Room	No.	Total
Kitchen	43.00	30%	13.0 l/s	x 1.0	13.0 l/s
Utility room	43.00	19%	8.0 l/s	x 1.0	8.0 l/s
Bathroom/Ensuite (1)	43.00	19%	8.0 l/s	x 1.0	8.0 l/s
Sanitary accommodation (no bath or shower) (1)	43.00	14%	6.0 l/s	x 1.0	6.0 l/s
Bathroom/Ensuite (2)	43.00	19%	8.0 l/s	x 1.0	8.0 l/s
		100%	Σ Balance check =		43.0 l/s

6.10 **Example 10 - Detached 267m²**

Ventilation design sheet

Dwelling address	**Example 10**
Dwelling type	**Semi-detached house**
Total floor area	267.0 m^2
Ventilation system	Centralised Supply & Extract Mechanical Ventilation
Date of test	
Installer/builder (if applicable)	
Validation certificate number	1.91.0xx.21.001
Air permeability <	5 $m^3/(h.m$

Select rooms			**Area**		**Height**	
Kitchen	No.	1				
Utility room	No.	1				
Bathroom/Ensuite (1)	No.	1				
Sanitary accommodation (no bath or shower) (1)	No.	1				
Bathroom/Ensuite (2)	No.	1				
Bathroom/Ensuite (3)	No.	1				
	No.					
Living room (1)	No.	1	18	m^2	2.6	m
Dining room	No.	1	30	m^2	2.6	m
Playroom	No.	1	17	m^2	2.6	m
Study room	No.	1	14	m^2	2.6	m
Reception room	No.	1	16	m^2	2.6	m
Bedroom 1	No.	1	21	m^2	2.4	m
Bedroom 2	No.	1	17	m^2	2.4	m
Bedroom 3	No.	1	15	m^2	2.4	m
Bedroom 4	No.	1	17	m^2	2.4	m
Bedroom 5	No.	1	12	m^2	2.4	m
Bedroom 6	No.			m^2		m
	No.			m^2		m
	No.			m^2		m
	No.			m^2		m

Step 1 - General ventilation rate

Calculated general ventilation rate based on occupancy of the dwelling [TGD F – 1.2.3.2]:		Calculated general ventilation rate based on internal floor area of the dwelling [TGD F – 1.2.3.2]:
5 l/s plus 4 l/s x Persons		Floor Area m^2 at 0.3 l/s/m^2
Persons =	7	
5 l/s + (4 l/s x Persons) =	33.0 l/s	80.1 l/s
(Assume 2 people in main bedroom and second bedroom and 1 person in every additional bedroom)		

General ventilation rate of the dwelling is the greater of the above = 80.1 l/s

General continuous supply ventilation rate of the dwelling is = 80.1 l/s

General continuous extract ventilation rate of the dwelling is = 80.1 l/s

Step 2 – Overall minimum boost extract ventilation rate

Overall minimum boost extract ventilation rate requirement [TGD F - Table 2]:

Kitchen	1	x	13	=	13
Utility room	1	x	8	=	8
Bathroom/Ensuite (1)	1	x	8	=	8
Sanitary accommodation (no bath or shower) (1)	1	x	6	=	6
Bathroom/Ensuite (2)	1	x	8	=	8
Bathroom/Ensuite (3)	1	x	8	=	8
	0	x	0	=	0
					51.0 l/s

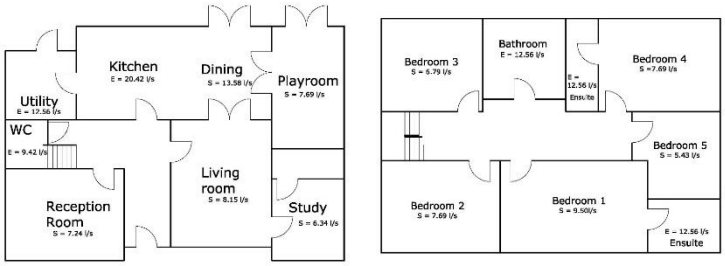
Step 3 – Ventilation system capacity

25% capacity requirement over general ventilation rate of the dwelling [TGD F - 1.2.3.4]:

Greater of overall minimum boost extract rate and (General ventilation rate * 1.25) = 100.1 l/s

The total capacity of the ventilation system required is = 100.1 l/s

This is the total capacity of the ventilation system that is required.



Room with MVHR supply terminal(s)	Room area (m^2)	Room volume (m^3)	Room general supply airflow rate (l/s)		
			Supply	% Vol	Total
Living room (1)	18	46.8	80.10	10.5%	8.4 l/s
Dining room	30	78.0	80.10	17.6%	14.1 l/s
Playroom	17	44.2	80.10	10.0%	8.0 l/s
Study room	14	36.4	80.10	8.2%	6.6 l/s
Reception room	16	41.6	80.10	9.4%	7.5 l/s
Bedroom 1	21	50.4	80.10	11.4%	9.1 l/s
Bedroom 2	17	40.8	80.10	9.2%	7.4 l/s
Bedroom 3	15	36.0	80.10	8.1%	6.5 l/s
Bedroom 4	17	40.8	80.10	9.2%	7.4 l/s
Bedroom 5	12	28.8	80.10	6.5%	5.2 l/s
Bedroom 6					
Total	177.00	443.8	Σ Balance check =		80.1 l/s

Room with MEV/MVHR extract terminal(s)	General Room extract airflow rate (l/s)				
	Extract	% Ext	Per Room	No.	Total
Kitchen	80.1	25%	20.4 l/s	x 1.0	20.4 l/s
Utility room	80.1	16%	12.6 l/s	x 1.0	12.6 l/s
Bathroom/Ensuite (1)	80.1	16%	12.6 l/s	x 1.0	12.6 l/s
Sanitary accommodation (no bath or shower) (1)	80.1	12%	9.4 l/s	x 1.0	9.4 l/s
Bathroom/Ensuite (2)	80.1	16%	12.6 l/s	x 1.0	12.6 l/s
Bathroom/Ensuite (3)	80.1	16%	12.6 l/s	x 1.0	12.6 l/s
		100%	Σ Balance check =		80.1 l/s

Room with MVHR supply terminal(s)	Room area (m^2)	Room volume (m^3)	Room Minimum Boost supply airflow rate (l/s)		
			Supply	% Vol	Total
Living room (1)	18	46.8	80.10	10.5%	8.4 l/s
Dining room	30	78.0	80.10	17.6%	14.1 l/s
Playroom	17	44.2	80.10	10.0%	8.0 l/s
Study room	14	36.4	80.10	8.2%	6.6 l/s
Reception room	16	41.6	80.10	9.4%	7.5 l/s
Bedroom 1	21	50.4	80.10	11.4%	9.1 l/s
Bedroom 2	17	40.8	80.10	9.2%	7.4 l/s
Bedroom 3	15	36.0	80.10	8.1%	6.5 l/s
Bedroom 4	17	40.8	80.10	9.2%	7.4 l/s
Bedroom 5	12	28.8	80.10	6.5%	5.2 l/s
Bedroom 6					
Total	177	443.8	Σ Balance check =		80.1 l/s

Room with MEV/MVHR extract terminal(s)	Room Minimum Boost extract airflow rate (l/s)				
	Extract	% Ext	Per Room	No.	Total
Kitchen	80.10	25%	20.4 l/s	x 1.0	20.4 l/s
Utility room	80.10	16%	12.6 l/s	x 1.0	12.6 l/s
Bathroom/Ensuite (1)	80.10	16%	12.6 l/s	x 1.0	12.6 l/s
Sanitary accommodation (no bath or shower) (1)	80.10	12%	9.4 l/s	x 1.0	9.4 l/s
Bathroom/Ensuite (2)	80.10	16%	12.6 l/s	x 1.0	12.6 l/s
Bathroom/Ensuite (3)	80.10	16%	12.6 l/s	x 1.0	12.6 l/s
		100%	Σ Balance check =		80.1 l/s

7.0 Calibration certificates

We require calibration certificates for all measuring instruments.

The Domestic Ventilation Compliance Guide states that the instrumentation must be calibrated annually by an accredited laboratory such as INAB, UKAS or similar approved. It also states that instrumentation used for measuring airflow rate must provide a measurement accuracy of ± 5%.

The Independent third-party calibration certificate will provide readings for reference flow to indicated flow across the required flow range. The calibration is carried out in laboratory conditions, so the certificate will give an indication of any correction that needs to be made to the instrument when in use on site.

It is important not to assume that the certification supplied as standard with the instrument is compliant with the above requirements. Frequently, the certification supplied as standard by manufacturers or equipment suppliers is non-compliant.

The following key points need to be considered when determining whether airflow measurement instruments have been correctly calibrated:

- The complete instrumentation assembly, such as an anemometer and any additional hoods, must be calibrated together as a working measurement system.
- The equipment must be calibrated annually. Tests performed outside of the annual calibration period will not be valid.
- The equipment must be calibrated at an INAB accredited laboratory and an INAB certificate needs to be available for inspection. Calibrations that are "traceable to INAB" are non-compliant.
- The equipment must be calibrated for volume flow. Calibrations for velocity are non-compliant.
- The equipment must be calibrated over the range for which it is used. Measurements taken outside of the calibrated range are non-compliant.
- Where the airflow measurement instrument utilises a correction factor such as in method B - often referred to as the k factor or area factor - for its associated hood(s), the correction factor stated on the calibration certificate must be used for all tests on site. Note that different correction factors may exist for different hoods and for supply and extract directions of airflow. Where site airflow tests are performed without using the appropriate correction factors, the test will be non-compliant.
- A rotating vane anemometer is normally supplied calibrated for one direction of flow only. It will need to be reversed in the flow hood when changing from measuring supply to extract performance. This may also require a change of flow coefficients within the instrument. When site airflow tests are performed without such correction, the test will be non-compliant.

In year 2 and in subsequent years, ventilation validators will need to successfully complete a Proficiency test as described in Section 8.3 of this document. NSAI do not require an independent third-party calibration certificate in year 2 and in subsequent years.

Back to Top

8.0 The Measurement of Airflow

8.1 Different airflow measurement methods.

There are a few different airflow measurement methods that can be used for domestic ventilation installations – the unconditional method, the conditional method and the minimum benchmark method.

8.1.1 Unconditional method (Method A)

The **unconditional method (Method A)** of airflow measurement is the preferred method in all installation scenarios because of its accuracy and simplicity. As its name suggests, it is a method that is free from site-specific conditions such as fan type, fan model, airflow direction and instrumentation characteristics. There is no need to get the K-factor of all extract and supply grilles.

This measurement method uses a powered flow hood as shown in figure 1.

A powered flow hood is an air volume flow meter designed to eliminate back pressure and turbulent flow effects. There are a number of different types and hood configurations, but the operating principle of each instrument type is the same.

The operation of this device is based on a zero-pressure method, which compensates for the resistance of the measurement instrument and the characteristics of the air distribution system. The measurement system also senses the direction of flow, which means that the unit can be used to measure supply or extract systems without any change in configuration.

The unit incorporates a fan which rotates at a controlled speed. This means that the device is able to achieve a zero-pressure balance in the hood measurement system when placed over the inlet or outlet of a fan.

As soon as the zero-pressure state is achieved, which is normally between 4 and 20 seconds, the instrument displays the air volume flow rate. Some instruments may also display the air temperature.

A variety of flow hoods can be fitted to the device to enable measurement of airflow on different sizes of grilles and diffusers.

8.1.2 Conditional method (Method B)

The **conditional method (Method B)** needs to take into account specific site conditions such as fan performance characteristics, the resistance to airflow created by the measurement device and assorted correction and conversion factors (K-factors) depending on the type of measuring instrument used. It is a testing and commissioning process that requires great care to get consistently right on site. This method of measurement is less preferable to the unconditional method.

Measurement of fan performance should not be undertaken by using an anemometer without a hood. When placing a flow measurement hood over an air inlet or outlet, it is good practice to make sure that the hood's width and height are a minimum of 50 mm greater than that of the inlet or outlet. In order to achieve best measurement accuracy, the hood should always be positioned centrally over the air inlet or outlet.

8.1.3 **Minimum benchmark method (Method C)**

The **minimum benchmark method (Method C)** has been established to allow the testing of axial type fans in decentralised ventilation systems with intermittent extract fans, where correction factors specific to the fan and test equipment combination have not been generated. This method of measurement is less preferable to the unconditional method.

8.2 **Airflow measurement methods for different types of ventilation system**

The unconditional method is the preferred method in all scenarios because of its accuracy and simplicity.

Table 1 illustrates which measurement method can be applied to each particular type of ventilation system.

	Mechanical extract ventilation		Mechanical ventilation with heat recovery (MVHR)	Intermittent extract fans
	Decentralised (dMEV)	Centralised (MEV)	Centralised	Decentralised
Method A Unconditional measurement method	Yes	Yes	Yes	Yes
Method B Conditional measurement method	ONLY with specific correction factors for both the instrument and the fan	Not preferred	Not preferred	ONLY with specific correction factors for both the instrument and the fan
Method C Minimum benchmark method	No	No	No	Yes

Table 1 - Airflow measurement methods for different types of ventilation system

8.3 **Proficiency testing of Air Flow measuring device of measurement**

In year 1, in addition to having a valid calibration certificate for their measuring equipment as described in Clause 7.0 of this document, Ventilation validators will be required to pass an Air flow measurement proficiency testing.

The proficiency testing is conducted at the Waterford and Wexford Education and Training Board (WWETB) NZEB Training Centre located at Blackstoops, Old Dublin Road, Enniscorthy, Co. Wexford Y21 KN50 (See attached flyer). Applicants should contact WWETB directly and complete the proficiency test. WWETB issue the results directly to NSAI.

The proficiency test will entail measurement of air flow supply and extracts rates generated in controlled environment for flow rates in the range of 5-22 l/s.

Clause 8.2.1.2 of I.S. EN 14134:2019 requires that Air flow measuring instruments shall respect a maximum permissible measurement error of 10 % of the measured value or 1 l/s whichever is the greater.

9.0 Testing and commissioning ventilation systems

9.1 **Continuous mechanical extract Ventilation (CMEV)**
9.2 **Continuous mechanical supply and extract with heat recovery (MVHR)**

Testing procedure	
System specification	Confirm the system type and confirm design airflow requirements for each fan by comparison with TGD F. Pay particular attention to any specific controls' requirements. (For CMEV, the requirement on minimum equivalent area of background ventilators is set out in Clause 1.2.2.8 of TGD Part F)
Preparation	Prepare the dwelling for test: 1) Open all background ventilators, where applicable. 2) Close all internal doors & all external windows and doors. 3) Provision should be made to facilitate transfer of air and cross ventilation between rooms, e.g. a 10 mm gap should be provided under doors.
Instruments	Ensure that the measurement device has been configured correctly. Check: 1) The instrument is within calibration 2) The equipment has passed the proficiency test
Airflow measurements	1) Set the system to run in trickle mode. This may involve multiple fans for decentralised systems 2) Place the measurement device over the terminal. 3) Ensure that the terminal is centred within the measurement device. 4) Ensure that the measurement device has made a positive seal to the surrounding area of the fan. Where the fan is located on an uneven surface, such as textured wallpaper or stippled ceilings, the measurement device should be temporarily sealed to the surface. 5) Allow the instrument to stabilise and record the result on the test sheet. 6) Repeat at all terminals. 7) Enter all values on to the test sheet. 8) Confirm compliance with the minimum ventilation rates for each room. 9) Confirm the sum of the trickle rates meets the "whole dwelling ventilation rate" requirements. 10) Set the system to run in boost mode and repeats steps 2-7. 11) Confirm that each room boost rate meets the requirements for that room. 12) Confirm the minimum whole dwelling extract ventilation rate is at least the whole dwelling ventilation rate. 13) Confirm that the supply and extract rates are balanced in trickle and boost modes (applicable to MVHR only). 14) Confirm the total supply air has been distributed in proportion to the volumes of the habitable rooms (applicable to MVHR only).
System Controls	Check that the controls are operating correctly. This will include checking: means of electrical isolation, location of controls and operational requirements, such as activation of boost function.
Background ventilators	For CMEV only, establish that the minimum area of background ventilation has been provided for to meet the provisions of Clause 1.2.2.8 of TGD Part F.

9.3 **Background ventilators and intermittent extract fans**

Testing procedure	
System specification	Confirm the system type and confirm airflow requirements for each fan by comparison with Table 3 in TGD F. Pay particular attention to any specific controls' requirements.
Preparation	Prepare the dwelling for test: 1) Open all background ventilators, except in the room where the measurement is being taken. 2) Close all internal doors & all external windows and doors. 3) Provision should be made to facilitate transfer of air and cross ventilation between rooms, e.g. a 10 mm gap should be provided under doors.
Instruments	Ensure that the measurement device has been configured correctly. Check: 1) The instrument is within calibration 2) The equipment has passed the proficiency test
Airflow measurements	1) Place the measurement device over the intermittent fan/terminal. 2) Ensure that the extract terminal is centred within the measurement device. 3) Ensure that the measurement device has made a positive seal to the surrounding area of the fan. Where the fan is located on an uneven surface, such as textured wallpaper or stippled ceilings, the measurement device should be temporarily sealed to the surface. 4) Allow the instrument to stabilise and record the result on the test sheet. 5) Repeat for all fans/ terminals. 6) Enter all values on to the test sheet. 7) Confirm compliance with the minimum ventilation rates for each type of room.
System Controls	Check that the controls are operating correctly. This will include checking: means of electrical isolation, location of controls and operational requirements, such as over-runs
Background ventilators	Establish that the minimum area of background ventilation has been provided for to meet the provisions of TGD Part F, Table 3.

9.4 **Passive stack ventilation (PSV)**

Testing procedure	
System specification	Confirm the system type and confirm PSV duct sizes and minimum area of background ventilation with BRE IP 13/94 and TGD F.
PSV System Controls	Check that the controls are operating correctly and meet requirements of BRE IP 13/94. This will include checking: means of electrical isolation, location of controls and operational requirements.
PSV Ducts Layout	Visual Check that ridge and roof duct terminals have been provided for to meet the provisions of BRE IP 13/94. Visual Check that stack ducts bending is less than 45°. Visual Check resistance to air flow is minimised by having ducts as near vertical as possible. Check there is no noticeable crossflow between kitchen and bathroom/WC. Check insulation of ducts with no evidence of condensation running back into the dwelling.
PSV Ducts Sizes	Establish that the minimum duct sizes have been provided for to meet the provisions of BRE IP 13/94.
Background ventilators	Establish that the minimum area of background ventilation has been provided for to meet the provisions of TGD Part F, Table 3.

10.0 Scheme Costs

Certification Fees applicable to Air Tightness Tester Scheme & Ventilation Validator Scheme		
	Air Tightness Tester Scheme	**Ventilation Validator Scheme**
Application Fee	Waived	Waived
Registration Audit [1]	€1250	€1250
Surveillance audit [2]	€1250	€1250
Annual Registration Fees First Tester/Validator per organisation	€500	€500
Annual Registration Fees Each Additional Tester/Validator per organisation	€250	€250
Add Additional Ventilation Validators or Airtightness Testers from a registered organisation to the schemes	Please send a completed request for quotation form to sustainability@nsai.ie for a quotation.	
[1]Registration audits are the initial audits conducted for registration to the schemes. The registration audit fee covers one pre audit submission of documents, site audit and one subsequent satisfactory post audit submission. Subsequent submissions will be charged at an additional €625. [2] A surveillance audit applies annually from the registration audit. A surveillance audit can include a maximum of 3 registered Airtightness Testers per day, or a maximum of 1 registered Ventilation Validator per		

day. Companies with an excess of three Airtightness testers, or one Ventilation Validator, will result in additional audit days at the same rates.

All rates are exclusive of VAT

The **Validator of Ventilation Systems** will be subject to an annual audit. Results of all tests must be retained for future inspection during annual audit.

Back to Top

11.0 Audit Requirements

11.1 Initial Audit

Under the scheme, NSAI inspectors assess the operations and procedures of the Ventilation validator. NSAI inspectors witness a ventilation check and will review the accuracy of the applicant's assessment of the as presented ventilation design for the same dwelling.

11.1.1 Establish that the applicant is familiar with the requirements of TGD to Part F of the Building Regulations.

11.1.2 Check that the applicant can establish that the presented ventilation design provides for the minimum ventilation requirements as described in TGD to Part F - Ventilation (2019) of the Building Regulations.

11.1.3 Check that the applicant is familiar with "Installation and Commissioning of Ventilation Systems for Dwellings-Achieving Compliance with Part F".

11.1.4 Check that the applicant is familiar with and has reviewed the "handover documentation" supplied to the end user.

11.1.5 Check that the applicant can correctly configure the dwelling prior to measuring the flow rate in the ventilation system as per their QA procedures document.

11.1.6 Check that test equipment has a valid calibration certificate.

11.1.7 Check that the applicant has successfully passed the **Air flow measurement proficiency testing** described in Clause 8.3 of this document.

11.1.8 Check that the applicant retains adequate documentary evidence when carrying out a validation check i.e. retains a copy of the presented ventilation design, name of installer, site/location, copy of plans, section and elevations (if applicable) of the dwelling, name of designer, air inlet and outlet technical datasheets including K-values (if applicable) etc.

11.1.9 Check that the applicant has an adequate template to issue a 'Ventilation validation Certificate' containing a unique 'Ventilation validation Certificates Number'.

11.2 Annual Surveillance audit

11.2.1 Review the register of completed tests performed since registration.

11.2.2 Review QA procedures document to establish if there have been any changes to same since certification.

11.2.3 Select and review 3 representative test reports,

i. Check records for calculations.

ii. Check recorded values in report.

iii. Check content of report against the audit document.

11.2.4 Check proficiency test is valid.

11.2.5 Review and discuss scheme document.

Back to Top