



NSAI
Certification

NSAI

National Standards Authority of Ireland

Ventilation Validation Registration Scheme

Gary O'Sullivan

5th May 2022

Irish Building Regulations

On the **1st November 2019** the Department of Housing, Local Government and Heritage (DHLGH) published updates to two Irish Building Regulations namely

Part L - Conservation of Fuel and Energy - Dwellings
Part F – Ventilation

DHLGH published updated **Technical Guidance Document** (TGD) Part L and Part F

Subject to transitional arrangements the updated regulations came into full effect 1st November 2020



Some impacts of Part L Dwelling & Part F 2019

TGD Part L Dwelling 2019

- Typically BER A2 or Better
- Renewable Energy Ratio = 0.20
- MPEPC (0.3) and MPCPC(0.35) (equivalent to 70% Reduction on 2005)
- Elemental backstop U-values improved
- Upper Air permeability now $5 \text{ m}^3/(\text{h.m}^2)$
- **All dwelling** require an airtight test

TGD Part F 2019

- Air permeability index $< 5 \text{ m}^3/(\text{h.m}^2)$
- Dwelling with $< 3 \text{ m}^3/(\text{h.m}^2)$ must have some form on mechanical extract ventilation i.e. natural ventilation will not be acceptable
- All ventilation systems to be validated by an **independent competent person** certified by NSAI or equivalent.

1.2.1.10 Ventilation systems should be designed by competent designers. Systems should be installed, balanced and commissioned by competent installers e.g. Quality and Qualifications Ireland accredited or Education Training Board or equivalent. Systems, when commissioned and balanced, should then be validated by a competent person to ensure that they achieve the design flow rates. The validation should be carried out by a person certified by an independent third party to carry out this work, e.g. Irish National Accreditation Board (INAB), National Standards Authority of Ireland (NSAI) certified or equivalent.

Detailed information on the installation and commissioning of ventilation systems is provided in *Installation and Commissioning of Ventilation Systems for Dwellings-Achieving Compliance with Part F*.

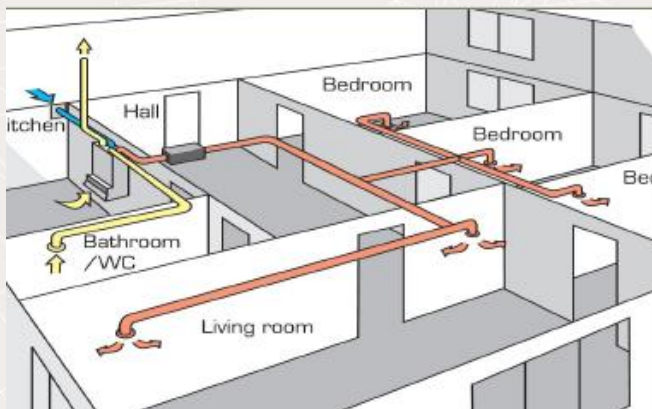
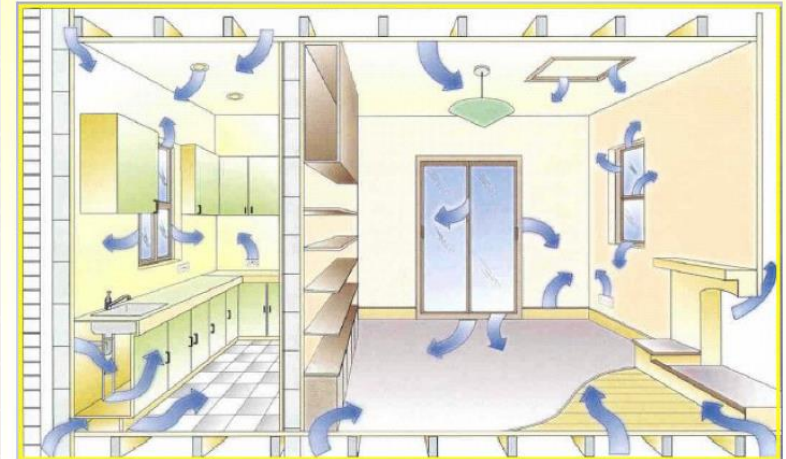
TGD Part F 2019

Ventilation Heat Loss

Domestic Energy Assessment Procedure (DEAP) considers both designed and un-designed Ventilation Heat Loss when calculating the BER for a Dwelling

Un-designed

Air tightness Testing Scheme
70 NSAI Registered testers



Designed

General principles

This new scheme

Ventilation Validation Registration Scheme

Has been developed to drive compliance in this area

Typical designed ventilation approaches in Ireland

TGD to Part F 2019 gives guidance on minimum ventilation design for dwellings for



Natural Ventilation with intermittent fans mechanical extract

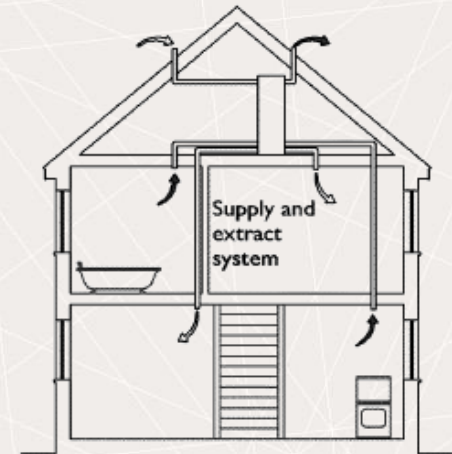
Only suitable for dwelling air permeability index is greater than $3 \text{ m}^3/(\text{h.m}^2)$ and less than $5 \text{ m}^3/(\text{h.m}^2)$
Difficult to design for.

Passive Stack

Mechanical ventilation

Centralized Continuous Mechanical Extract Ventilation (CMEV)
Centralized Mechanical Ventilation with Heat Recovery (MVHR)


Demand Control ventilation (DCV)



Ventilation Validation Registration Scheme

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 Part F - Ventilation (2019) to the Irish Building Regulations.

D-IAB-009 Ventilation Validation Reg Scheme Master Doc Rev 7.docx

 NSAI		NSAI Agrément	
Document Title	NSAI Agrément Certified	Reference	D-IAB-009
Ventilation Validation Registration Scheme	Ventilation Validation Registration Scheme	Page	Page 1 of 37
		Issue date	30/09/2021
		Revision	See footer

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

Ventilation Validation Registration Scheme

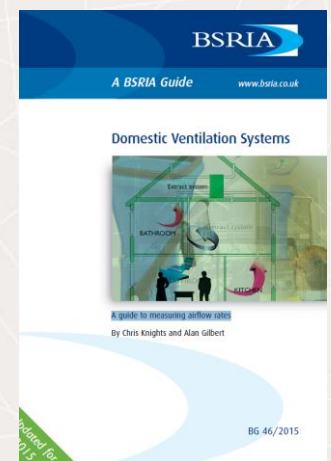
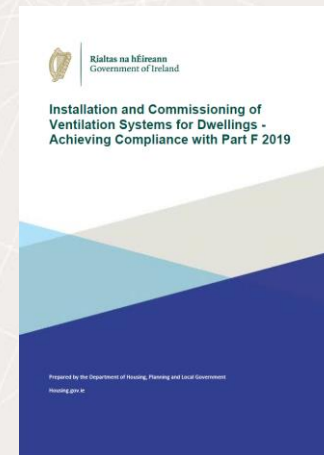
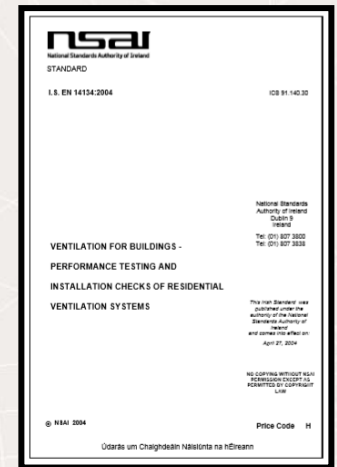
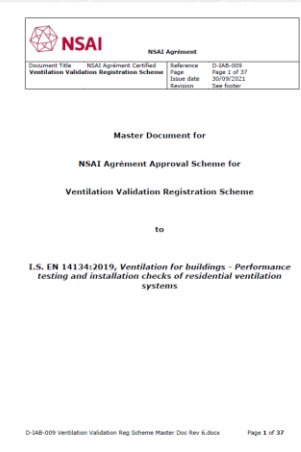
Reference documents

NSAI Ventilation Validation Registration Scheme Master Document give guidance on the scheme requirements and design examples

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

Department of Housing, Planning and Local Government (DHPLG) have published a guidance document on "Installation and Commissioning of Ventilation Systems for Dwellings - Achieving Compliance with Part F 2019"

BSRIA - Domestic Ventilation Systems, a guide to measuring airflow rates



Ventilation Validation Registration Scheme

Ventilations systems must be designed and commissioned to provide adequate and effective means of ventilation to satisfy the minimum requirements 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.



Ventilation Validation Registration Scheme

The NSAI Certified Ventilation validator will be expected to validate that a ventilation system has been installed, balanced and commissioned to meet the **minimum requirements** of TGD to Part F of the Building regulations.

- On arrival to a site, the Ventilation validator shall be presented with a **ventilation design** and installers commissioning certificate.
- The Ventilation validator will assess that the presented design will satisfy the minimum requirements of TGD to Part F.
- They shall then proceed to take measurements to establish that the commissioned system complies with the satisfactory presented design.
- The Ventilation validator will issue a “**Ventilation validation Certificate**”



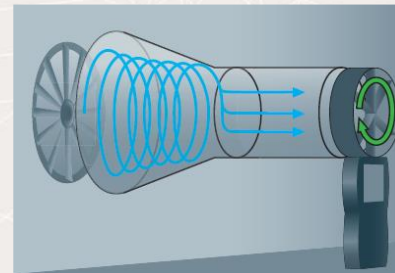
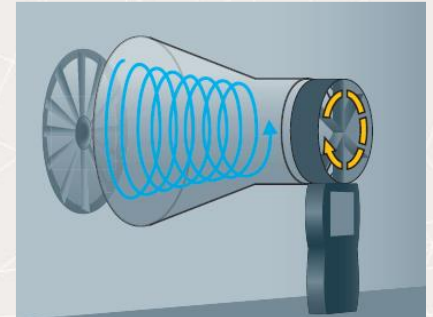
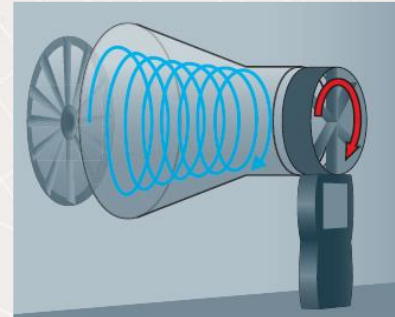
Ventilation Validation Registration Scheme Development

During the development of the scheme, we made it a requirement that all instrumentation must be calibrated by an accredited laboratory such as INAB, UKAS or similar approved.

Despite having calibrated equipment, flow measurement reading on a control house varied greatly.

It was clear that operatives did not know how to correctly configure their equipment to record accurate reading.

Furthermore flow straightener were not being used



Ventilation Validation Registration Scheme Development and WWETB

As mentioned previously operatives did not know how to correctly configure their equipment to record accurate reading.

To this end a "Proficiency testing unit" was built by Lindab and is located at WWETB.

The unit consists of two lines (line A and B) with a supply and extract grill on each line.

Each line contains a UltraLink flow monitor and a fan with 5 speed settings (4-20L/s).

Ventilation Validators must successfully complete and pass a proficiency test which establishes that they can measure flow rates accurately.



TGD to Part F 2019 - Ventilation

Let's consider a

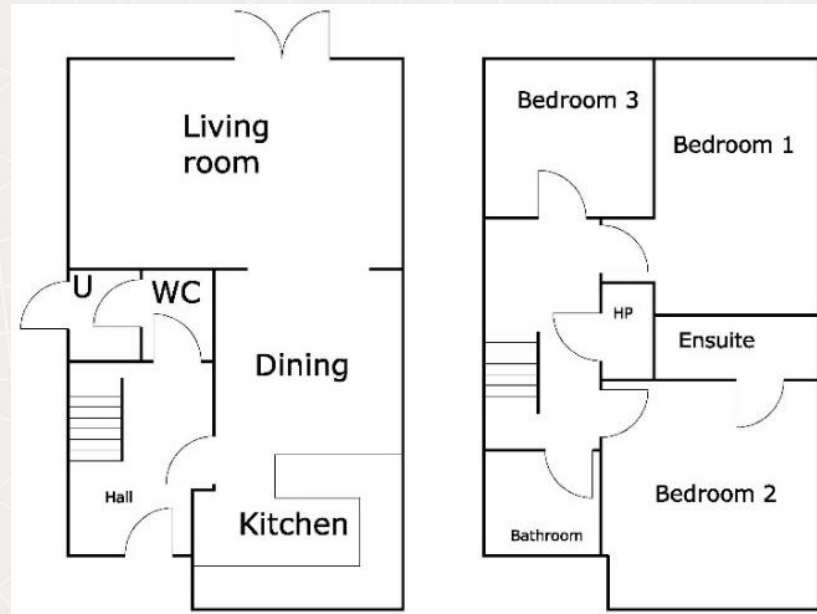
Centralized Continuous Mechanical
Extract Ventilation (**CMEV**)

or

Centralized Mechanical Ventilation
with Heat Recovery (**MVHR**)

Take a

- 122 m²
- 3 bedrooms
- 2.4m floor to ceiling height



TGD to Part F 2019 - Ventilation

Next we must establish the **minimum boost extract** ventilation rate.

In this example the
General ventilation Rate < Overall
Minimum boost extract rate

TGD F give minimum boost extract rate

Table 1: Centralised continuous mechanical extract ventilation systems: minimum extract rates¹

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.	

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.

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
				<u>43.0</u> 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) =	<u>45.8</u> 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.	

Waterford and Wexford Education and Training Board (WWETB)

TGD to Part F 2019 - Ventilation

- From above the General continuous supply ventilation rate of the dwelling is = 36.6l/s
- Supplies are into habitable room (except kitchen) with extracts from wet rooms.
- Upper table takes the total supply ventilation rate and redistributes that supply to the habitable rooms in the ratio of the volume of those rooms.
- The second table takes the base line extract rates from Table 1 or 2 and proportionately decreases (or increases) the base line extract rates to achieve a balanced ventilation system.

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	± 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%	± 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	± 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%	± Balance check = 43.0 l/s		

Sample Ventilation Validation Certificate

Ventilation validation certificate							
Dwelling address		Cedarview House Type B					
Dwelling type		Semi-detached house					
Total floor area		159.65 m ²					
Ventilation system		MVHR					
Date of test		26.09.2019					
Installer/builder (if applicable)							
Validation certificate number		1.92.0xx.22.001 (NSAI File Number/Year/sequential 3-digit figure)					
Supply air	Presented design supply air flows rates		Measured supply air flow rate at trickle		Measured supply air flow rate at boost		
	Trickle	Boost	Trickle	Tolerance check	Boost	Tolerance check	
Living room (1)	11.02	14.00	12.00	0.7%	14.20	1.4%	
Dining room	4.97	5.83	5.00	Within 1 l/s	6.00	Within 1 l/s	
Playroom							
Study room							
Reception room							
Bedroom 1	6.95	8.17	7.00	Within 1 l/s	8.00	Within 1 l/s	
Bedroom 2	8.14	9.57	8.00	Within 1 l/s	9.40	Within 1 l/s	
Bedroom 3	4.62	5.43	5.00	Within 1 l/s	5.30	Within 1 l/s	
Bedroom 4							
Bedroom 5							
Bedroom 6							
	36.60	43.00	37.00	1.09%	42.90	-0.23%	
Extract air	Presented design extract air flows rates		Measured extract air flow rate at trickle		Measured extract air flow rate at boost		
	Trickle	Boost	Trickle	Tolerance check	Boost	Tolerance check	
Kitchen	11.07	13.00	11.40	3.0%	12.50	-3.8%	
Utility room	6.81	8.00	6.40	Within 1 l/s	7.80	Within 1 l/s	
Bathroom/Ensuite (1)	6.81	8.00	6.40	Within 1 l/s	7.90	Within 1 l/s	
Sanitary accommodation (no bath or shower)	5.11	6.00	5.00	Within 1 l/s	5.80	Within 1 l/s	
Bathroom/Ensuite (2)	6.81	8.00	6.60	Within 1 l/s	7.60	Within 1 l/s	
	36.60	43.00	35.80	-2.2%	41.60	-3.26%	
RESULTS							
Allowable supply trickle error/uncertainty*						5.20 l/s	
Allowable supply boost error/uncertainty*						5.42 l/s	
The total measured supply trickle air flow rate was within tolerance of the presented design trickle air flow rate						PASS	
The total measured supply boost air flow rate was within tolerance of the presented design boost air flow rate						PASS	
Trickle supply > trickle extract but >15%						PASS	
Boost supply > boost extract but >15%						PASS	
Check on individual minimum boost extract rates						PASS	
Opinion on compliance that the measure system achieved the presented design air flow rates:-						PASS	
Overall comments:-							
Examples of comments							
10mm undercut were present at the time of validation inspection but there were no floor finishes downstairs.							
Trickle supply was not greater than trickle extract by 0.4 l/s which is a relatively small variance							
The measured boost extract in Bathroom/Ensuite (1) was greater than the allowable 10%							
Comments on design:-							
The design flowrates provided to the NSAI Validator matched the NSAI design sheet which follows the general ventilation requirements outlined in Clause 1.2.2/1.2.3 of TGD to Part F of the Building Regulations.							
SIGNED		Name, Company					
		Report print date & time 28/04/2022 16:38					
* Measured error/uncertainty = 1 l/s < 10 l/s or 10% > 10 l/s							

5th May 2022

Sample Ventilation Validation Certificate

Ventilation validation certificate



Dwelling address	House Type B						
Dwelling type	Semi-detached house						
Total floor area	159.65		m²				
Ventilation system	MVHR						
Date of test	26.09.2019						
Installer/builder (if applicable)							
Validation certificate number	1.92.0xx.22.001 (NSAI File Number/Year/sequential 3-digit figure)						
Supply air	Presented design supply air flows rates		Measured supply air flow rate at trickle		Measured supply air flow rate at boost		
	Trickle	Boost	Trickle	Tolerance check	Boost	Tolerance check	
Living room (1)	11.92	14.00	12.00	0.7%	14.20	1.4%	
Dining room	4.97	5.83	5.00	Within 1 l/s	6.00	Within 1 l/s	
Playroom							
Study room							
Reception room							
Bedroom 1	6.95	8.17	7.00	Within 1 l/s	8.00	Within 1 l/s	
Bedroom 2	8.14	9.57	8.00	Within 1 l/s	9.40	Within 1 l/s	
Bedroom 3	4.62	5.43	5.00	Within 1 l/s	5.30	Within 1 l/s	
Bedroom 4							
Bedroom 5							
Bedroom 6							
	36.60	43.00	37.00	1.09%	42.90	-0.23%	

Check on
NSAI
website

5th May 2022



Sample Ventilation Validation Certificate

Extract air	Presented design extract air flows rates		Measured extract air flow rate at trickle		Measured extract air flow rate at boost	
	Trickle	Boost	Trickle	Tolerance check	Boost	Tolerance check
Kitchen	11.07	13.00	11.40	3.0%	12.50	-3.8%
Utility room	6.81	8.00	6.40	Within 1 l/s	7.80	Within 1 l/s
Bathroom/Ensuite (1)	6.81	8.00	6.40	Within 1 l/s	7.90	Within 1 l/s
Sanitary accommodation (no bath or shower)	5.11	6.00	5.00	Within 1 l/s	5.80	Within 1 l/s
Bathroom/Ensuite (2)	6.81	8.00	6.60	Within 1 l/s	7.60	Within 1 l/s
	36.60	43.00	35.80	-2.2%	41.60	-3.26%
RESULTS						
Allowable supply trickle error/uncertainty*						5.20 l/s
Allowable supply boost error/uncertainty*						5.42 l/s
The total measured supply trickle air flow rate was within tolerance of the presented design trickle air flow rate						PASS
The total measured supply boost air flow rate was within tolerance of the presented design boost air flow rate						PASS
Trickle supply > trickle extract but $\pm 15\%$						PASS
Boost supply > boost extract but $\pm 15\%$						PASS
Check on individual minimum boost extract rates						PASS
Opinion on compliance that the measure system achieved the presented design air flow rates:-						PASS
Overall comments:-						
Examples of comments						
10mm undercut were present at the time of validation inspection but there were no floor finishes downstairs.						
Trickle supply was not greater than trickle extract by 0.4 l/s which is a relatively small variance						
The measured boost extract in Bathroom/Ensuite (1) was greater than the allowable 10%						

Comments on design:-

The design flowrates provided to the NSAI Validator differed from the NSAI design sheet, the competent person responsible for the design should provide sufficient evidence and calculations to demonstrate adequate ventilation has been provided to satisfy the requirements of TGD to Part F of the Building Regulations.

SIGNED	Name, Company	
	Report print date & time	28/04/2022 10:29
* Measured error/uncertainty = 1 l/s < 10 l/s or 10% > 10 l/s		

5th May 2022

Demand Control ventilation (DCV)

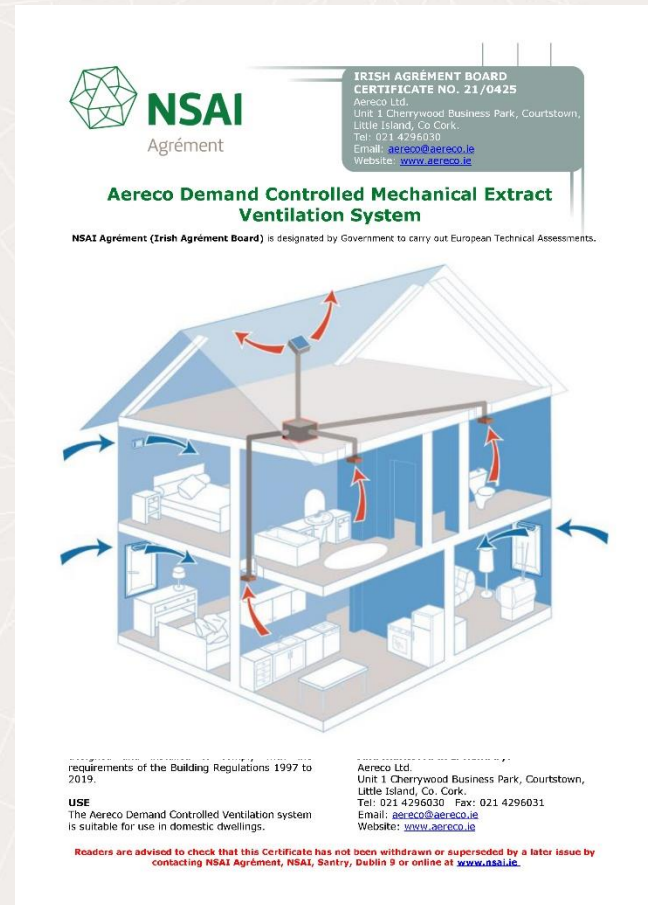
Demand control ventilation systems require a Ventilation Validation Certificate.

DCV systems utilise humidity-controlled extract units which provide high levels of ventilation in time of high humidity.

In times of low occupancy (low humidity) DCV can provide lower levels of ventilation but must still achieve the minimum general ventilation rate as required by TGD Part F.

If DCV systems wish to operate sub the minimum general ventilation rate as required by TGD Part F, then a NSAI Agrément certificate (or similar) will be required to support that Indoor Air Quality (IAQ) is not compromised.

Currently Aereco Ltd. have a Agrément Certificate for their Demand Control Mechanical Extract Ventilation (DCMEV) system.



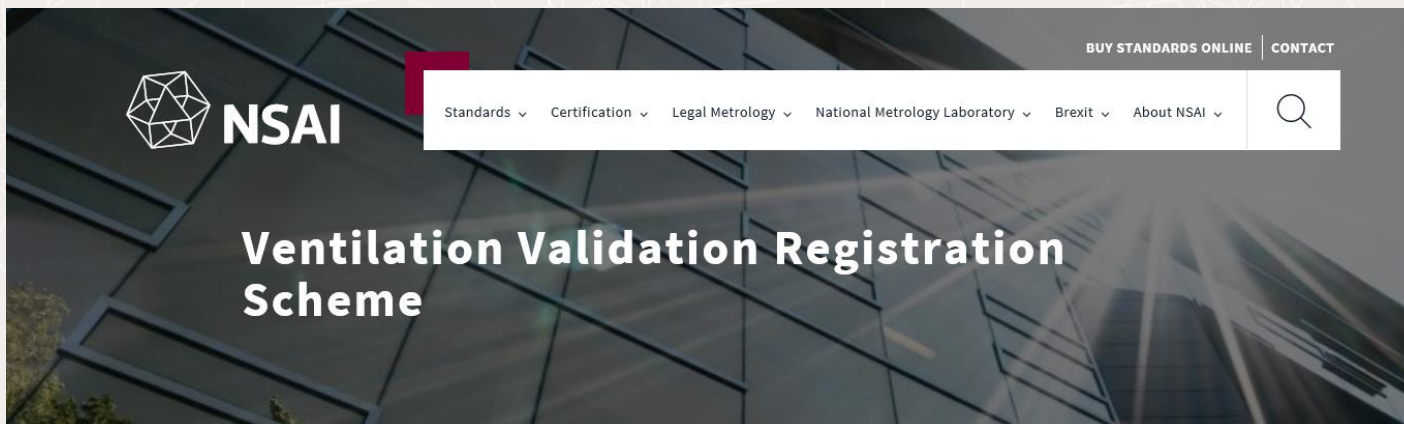
Compliance requirements Part L & Part F

So what need to be checked?

1. Look for the airtightness test, Air permeability index $< 5 \text{ m}^3/(\text{h.m}^2)$
2. If the Air permeability index $< 3 \text{ m}^3/(\text{h.m}^2)$, natural ventilation will not be acceptable and some form of mechanical ventilation is required
3. Check the ventilation validation certificate is a Pass



RESULTS	
Allowable supply trickle error/uncertainty*	5.20 l/s
Allowable supply boost error/uncertainty*	5.42 l/s
The total measured supply trickle air flow rate was within tolerance of the presented design trickle air flow rate	PASS
The total measured supply boost air flow rate was within tolerance of the presented design boost air flow rate	PASS
Trickle supply > trickle extract but $\geq 15\%$	PASS
Boost supply > boost extract but $\geq 15\%$	PASS
Check on individual minimum boost extract rates	PASS
Opinion on compliance that the measure system achieved the presented design air flow rates:-	PASS



Ventilation Validation Registration Scheme

Website

Thank You

5th May 2022