



Rialtas na hÉireann
Government of Ireland

The context in Ireland - Changes to Irish regulations and inspection of ventilation systems

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Overview



- EPBD (NZEB, Major Renovations)
- 2018 Amendments (IAQ)
- Building Regulations - TGD L and TGD F 2019 changes
- Why do we need a third party validation scheme for ventilation systems?
- Training and NSAI ventilation validation scheme

Energy Performance of Buildings Directive (EPBD) NZEB and Major Renovations



Article 9

Member states to ensure that all new buildings are “Nearly Zero Energy Buildings” by 31st Dec 2020.

Article 7

Major Renovations to be at Cost Optimal Level in Building Codes.



EPBD - 2018 Amendments (IAQ)



2018 Art. 7: Member States shall encourage, in relation to buildings undergoing major renovation, high-efficiency alternative systems, in so far as this is technically, functionally and economically feasible, **and shall address the issues of healthy indoor climate conditions, fire safety** and risks related to intense seismic activity.'

2018 Annex 1. The energy needs for space heating, space cooling, domestic hot water, ventilation, lighting and other technical building systems **shall be calculated in order to optimise health, indoor air quality and comfort levels defined by Member States at national or regional level.**

Irish Building regulations



- Part L – Conservation of Fuel and Energy – Dwellings
- Part F – Ventilation
- Part L & F 2019 to be signed by Minister in coming weeks
- TGD L & F 2019 Dwellings intended to apply to new Dwellings commencing construction from 1st November 2019 subject to transition
- Transitional arrangements intended to allow TGD L 2011 and TGD F 2009 - Dwellings to be used where planning approval or permission has been applied for on or before application date and substantial completion is completed within 1 year i.e. by 1st November 2020

NZEB dwellings in Ireland



MPEPC = 0.3, MPCPC = 0.35, RER = 20%
A2 rated, $\sim 40\text{kWh}\cdot\text{m}^{-2}\cdot\text{yr}^{-1}$ and $\sim 8\text{kg}\cdot\text{m}^{-2}\cdot\text{yr}^{-1}$

TGD L 2019 – Table 1 and Appendix E

Constructions	Backstop U-values	Recommended U-values
External walls	0.18 W/m²K	0.13 W/m²K
Roofs	0.16 W/m²K	0.11 W/m²K
Windows	1.4 W/m²K	0.9 W/m²K
Floor	0.18 W/m²K	0.14 W/m²K
Air Permeability	5 m³/h.m²	3 m³/h.m²

Airtight and well insulated dwellings - Associated risks of overheating and under-ventilation.

Ventilation compliance rate?



- **Ireland: Marie Coggins et al. (2010)**

4 in 5 dwellings to Building Regulations 2007 had air exchange rates below minimum requirement of 0.5 ACH.

- **Scotland: Ian Mawditt, Tim Sharpe et al. (2015)**

12 in 18 dwellings to Building Regulations 2010 did not meet minimum airflow rate requirements.

52% of MVHR imbalanced (>15%), 27% significantly out of balance (>30%)

Ventilation compliance rate?



- **France: Jobert (2012) and Guyot et al. (2015)**

1287 new dwellings – 68% had non-compliant ventilation systems

21 in 21 low-energy houses to Building Regulations 2012 did not comply fully with ventilation requirements:

- 55% due to poor on-site installation
- 43% due to a poor design
- 2% due to inappropriate use/maintenance by end user

- **UK: Zero Carbon Hub (2016)**

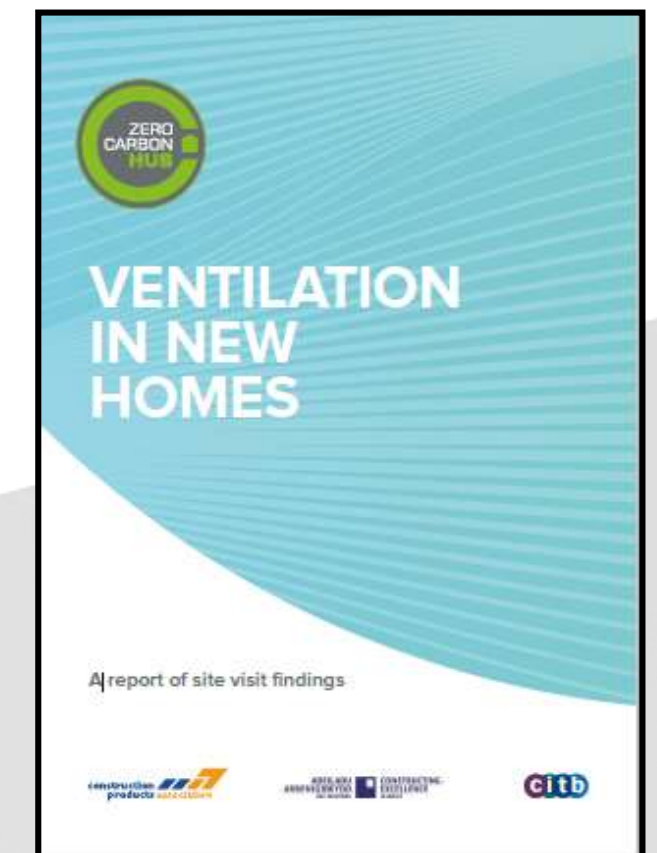
33 dwellings – 6 sites to Building Regulations 2010.

Not one site complied with Building regulations on ventilation.

- **UK: AECOM (2016)**

2 in 55 new dwellings with NV complied and 1 in 25 new dwellings with MEV complied.

Only 16% of MVHR were installed correctly.



TGD F 2019: Changes vs 2009



- TGD L 2019 introduces backstop values of 5 m³/h.m² for air permeability.
- TGD F 2019 ventilation systems application range:

Ventilation System	Air Permeability range: 3-5 m ³ /h.m ²	Air Permeability range: Less than 3 m ³ /h.m ²
CMEV	✓	✓
MVHR	✓	✓
Natural Ventilation with intermittent extract ventilation	✓	✗

TGD F 2019: Changes vs 2009



- **1.2.4: Natural ventilation with intermittent extract:**
Minimum (total) equivalent area of background ventilators increase

Room or Space	Minimum equivalent area of background ventilator (mm ²)	
	2009	2019
Habitable room	5,000	7,000
Kitchen, Utility Room , Bathroom, Sanitary Accommodation	2,500	3,500
The minimum total equivalent area of background ventilators for the dwelling providing general ventilation should be	30,000	42,000
with an additional mm ² for each additional 10 m ² floor area above the first 70m ² of floor area measured.	5,000	7,000

TGD F 2019: Changes vs 2009



- **Energy Efficiency (TGD L 2019):**

Table 4 Minimum performance levels for mechanical ventilation systems	
System type	Performance
Maximum Specific Fan Power (SFP) for continuous supply only and continuous extract only	0.6 W/litre/sec
Maximum SFP for balanced systems	1.2 W/litre/sec ¹
Minimum Heat recovery efficiency	70 %

¹ For balanced systems with heating coils, add 0.3 W/litre/sec

- **Overheating risks guidance:**

- 1.2.3.12 Summer bypass recommended for MVHR,
- 1.2.4.6 Greater proportion of opening areas for Natural Ventilation (TGD L 2019 1.3.5.2 (d)).

TGD F 2019: Changes vs 2009



- **1.2.2.10 and 1.2.3.12: Control indicators**

Control indicators to be in a visible location to the occupant and not in a remote location such as in the attic or above the ceiling. Control indicators should indicate to the occupant that the system is operating correctly and if a fault has occurred.

- **1.2.2.12, 1.2.3.14 and 1.2.4.17: Information to home owner**

The owner of the building should be provided with sufficient information about the ventilation systems and their maintenance so that an effective and an efficient ventilation system can be operated and maintained.

TGD F 2019: Changes vs 2009



- **Appendix 1: 4 Examples**
 - Semi-detached house, CMEV
 - Semi-detached house, MVHR
 - Apartment, MVHR
 - Semi-detached house, Background Ventilation
- Calculation of minimum continuous and boost ventilation rates
- Calculation of extract and supply ventilation rates
- Distribution of extract and supply rates per room
- Calculation of minimum total equivalent area of background ventilators

TGD F 2019: Changes vs 2009



Example 2 – MVHR for 130m² 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

<p>Calculated general ventilation rate based on occupancy of the dwelling [TGD F – 1.2.3.2]:</p> <p>5 l/s plus 4 l/s person i.e. $5 \text{ l/s} + (4 \text{ l/s} \times 5) = 25 \text{ l/s}$</p> <p>(Assume 2 people in main bedroom and second bedroom and 1 person in third bedroom)</p>	<p>Calculated general ventilation rate based on internal floor area of the dwelling [TGD F – 1.2.3.2]:</p> <p>130 m² at 0.3 l/s/m² $(0.3 \times 130) = 39 \text{ l/s}$</p>
<p>General ventilation rate of the dwelling is the greater of the above: 39 l/s</p>	
<p>General continuous supply ventilation rate of the dwelling is: 39 l/s General continuous extract ventilation rate of the dwelling is: 39 l/s This is the minimum capacity of the ventilation system that is required.</p>	
<p>25% boost capacity requirement over general ventilation rate of the dwelling [TGD F - 1.2.3.5]:</p> <p>$39 \times 1.25 = 49 \text{ l/s}$</p>	<p>Overall minimum boost extract ventilation rate requirement [TGD F - Table 2]:</p> <p>$(1 \times 13) + (1 \times 8) + (1 \times 8) + (1 \times 6) = 35 \text{ l/s}$</p>
<p>General boost extract ventilation rate of the dwelling is the greater of the above: 49 l/s General boost supply ventilation rate of the dwelling is: 49 l/s This is the total capacity of the ventilation system that is required.</p> <p>Proportional adjustment of boost extract ventilation rate at each extract point is then required:</p> <p>Kitchen: $13 \times 49 / 35 = 18.2 \text{ l/s}$ Bathroom/Utility: $8 \times 49 / 35 = 11.2 \text{ l/s}$ Downstairs WC: $6 \times 49 / 35 = 8.4 \text{ l/s}$</p>	

TGD F 2019: Changes vs 2009



The total supply airflow rate of 39 l/s must be delivered to the habitable rooms in proportion to their volume.

Extract should be from each wet room and sanitary accommodation. Air should normally be supplied to each habitable room. The total supply airflow should usually be distributed in proportion to the habitable room volumes. Recirculation by the system of moist air from the wet rooms to the habitable rooms should be avoided.

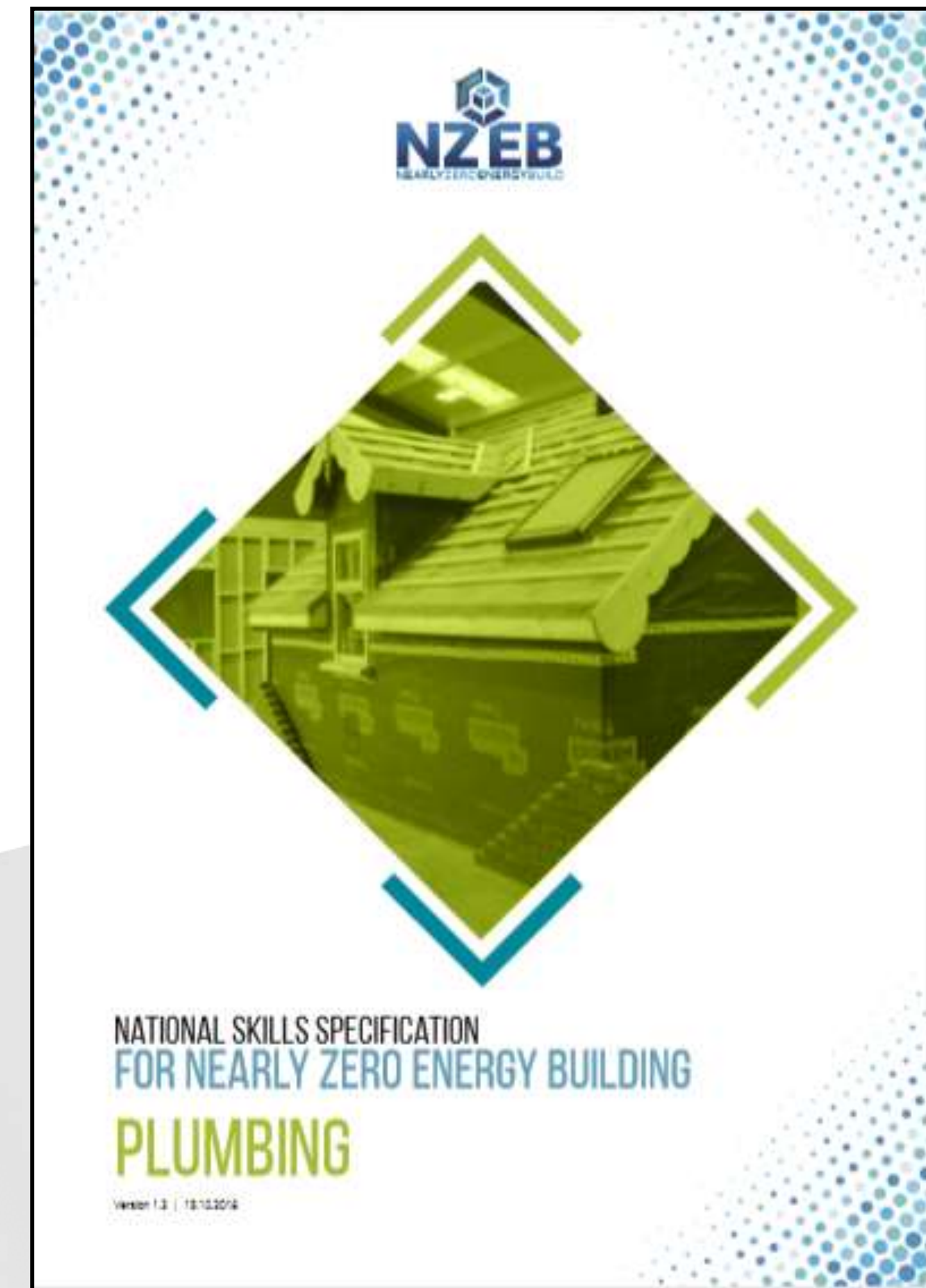
Room with MVHR supply grid (s)	Room area (m ²)	Room volume (m ³)	Room general supply airflow rate (l/s)
Bedroom 1	20	48	$39 * 48 / 218.4 = 8.6$
Bedroom 2	16	38.4	$39 * 38.4 / 218.4 = 6.9$
Bedroom 3	12	28.8	$39 * 28.8 / 218.4 = 5.1$
Sitting room	18	43.2	$39 * 43.2 / 218.4 = 7.7$
Living room	25	60	$39 * 60 / 218.4 = 10.7$
Total	91	218.4	39

Room with MVHR extract grid (s)	Room general extract airflow rate (l/s)
Kitchen	$39 * 18.2 / 49 = 14.5$
Bathroom	$39 * 11.2 / 49 = 8.9$
Utility	$39 * 11.2 / 49 = 8.9$
Downstairs WC	$39 * 8.4 / 49 = 6.7$
Total	39

Training



- *Systems should be installed, balanced and commissioned by competent installers e.g. QQI or ETB or equivalent.*
- Waterford and Wexford ETB – NZEB National Training centre, Enniscorthy
- Suite of NZEB training courses: Electrical, Plastering, Carpentry, Bricklaying, Plumbing, Site Supervisor
- Ventilation covered in Plumbing
- November 2018



NSAI Ventilation testing Validation Scheme



- Systems should **then** be validated - to ensure that they achieve the design flow rates - by an independent competent person certified by an independent third party e.g. NSAI or equivalent.
- **NSAI** currently consulting with Ventilation industry
- Based on **I.S. EN 14134:2004** Ventilation for Buildings – Performance Testing and installation checks of residential ventilation systems
- Testers of Certified Air Tightness Tester Scheme

NSAI Agreement			
Document Title	NSAI Agreement Certified Ventilation Testing Scheme	Reference Page Revision	D-LAB-xxxx Page 1 of 16 x

NSAI Agreement Approval Scheme for Ventilation Testing Validation Scheme Master Document

to

I.S. EN 14134:2004: Ventilation for buildings - Performance testing and installation checks of residential ventilation systems

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nsai
National Standards Authority of Ireland

STANDARD

I.S. EN 14134:2004

ICB 91.140.30

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VENTILATION FOR BUILDINGS - PERFORMANCE TESTING AND INSTALLATION CHECKS OF RESIDENTIAL VENTILATION SYSTEMS

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Price Code H

Údarás um Chaighdeán Náisiúnta na hÉireann

Existing NSAI Air Tightness Certified Testers Scheme (62 going up)



LEINSTER – 32	CONNACHT – 9	MUNSTER – 12	ULSTER – 9
Dublin – 6	Mayo – 4	Cork – 4	Armagh – 2
Meath – 6	Galway – 3	Kerry – 3	Donegal – 2
Kildare – 5	Sligo – 2	Tipperary – 2	Monaghan – 2
Wexford – 5		Waterford – 2	Cavan – 1
Carlow – 4		Clare – 1	Down – 1
Louth – 4			Tyrone – 1
Kilkenny – 1			
Longford – 1			

Achieving Compliance with Part F 2019



- *Systems should **then** be validated - to ensure that they achieve the design flow rates - by an independent competent person e.g. NSAI, INAB certified or equivalent.*
- Installation and commissioning Guide for:
 - Continuous Mechanical Extract Ventilation
 - Mechanical Ventilation with Heat Recovery
 - Natural Ventilationand
 - Completion checklist and installation/commission/validation sheet templates including measured and design flow rates.



Existing Dwellings and Major Renovations



Table 30 - Guidance for the provision of ventilation for retrofit works with air permeability levels $>5 \text{ m}^3/\text{hr}/\text{m}^2$

- Existing dwellings:

S.R. 54:2014 Code of Practice for the energy efficient retrofit of dwellings provides guidance.

Retrofit Works		Existing Dwelling Condition		
		A. No existing background ventilation in some or all habitable rooms and no extract ventilation in wet rooms	B. Existing purpose provided background ventilation in each habitable room. No extract ventilation provided in wet rooms	C. Existing purpose provided background ventilation in each habitable room. Extract ventilation provided in wet rooms
1.	Internal/External/ Cavity Insulation for Walls	Background ventilation should be provided to rooms without background ventilation in accordance with Column 2, Table 31	No requirement to upgrade background ventilation	No requirement to provide further ventilation
2.	Replacement of Windows	It is advised to provide extract ventilation in wet rooms in accordance with Column 3, Table 31	It is advised to provide extract ventilation in wet rooms in accordance with Column 3, Table 31	
3.	Sealing/insulating of timber suspended floors	Where evidence of inadequate ventilation exists (e.g. mould, condensation) - extract ventilation should be provided to all wet rooms in accordance with Column 3, Table 31	Where evidence of inadequate ventilation exists (e.g. mould, condensation) - extract ventilation should be provided to all wet rooms in accordance with Column 3, Table 31	No requirement to provide further ventilation
4.	Two or more of the above measures done in combination or separately	Background and extract ventilation should be provided in accordance with Table 31	No requirement to upgrade background ventilation Extract ventilation should be provided to all wet rooms in accordance with Table 31	
NOTE Covered/Damaged covers on ventilators should be replaced with equivalent or better. Deficiencies or faults in ventilator grills or fans should be rectified and returned to intended working condition.				
NOTE Where ventilation exists and severe conditions of condensation or mould growth have developed, specialist advise should be sought.				

Existing Dwellings and Major Renovations



- **1.2.2.13 and 1.2.3.15 Major Renovations:**

Where more than 25 % of the surface of the building envelope undergoes renovation the energy performance of the building or the renovated part thereof is upgraded in order to meet minimum energy performance requirements with a view to achieving a cost optimal level in so far as this is technically, functionally and economically feasible (125 kWh/m².yr - B2 rating).

Where new mechanical extract ventilation systems are installed as part of a Major Renovation as defined in Part L-2019, then the system should be designed, installed, commissioned and validated as per 1.2.2.11 and 1.2.3.13.



Q&A