

BSRIA Presentation on Part F Ventilation Testing



BSRIA

A Test, Consultancy, Test Instrumentation, Research, Market Intelligence, Information providing organisation

We specialise in construction and building services

Member based association

Our Mission is to

- **Make Buildings Better**

OUR VALUES –

Innovative
Independent
Authoritative
Collaborative



an Independent, Authoritative organisation that is respected throughout the Construction industry.

BSRIA Compliance Services

**BUILDING REGULATION
COMPLIANCE TESTING**

Part E: Sound Insulation
Part F: Ventilation
Part L: Air Tightness



BSRIA Compliance

Provides the Complete Building Regulations Compliance Testing Solution throughout the UK

Air Tightness Testing for Compliance with Part L1 Regulations
Sound Insulation Testing for Compliance with Part E Regulations
Ventilation Testing for Compliance with Part F Regulations

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Why it is important to have the correct levels of Ventilation

A growing body of research, suggests that problems created in the construction process, are creating a 'gap' in the actual performance of ventilation systems, compared to the design intent or regulatory requirements.

Without well thought-out ventilation strategies and properly functioning systems, indoor air quality in dwellings will be compromised, potentially leading to health issues for the occupants and/or damage to the building fabric through condensation and mould.

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It is therefore very important to supply sufficient purpose built ventilation to prevent this.

A review of air tightness test data (the level of air permeability commonly achieved in dwellings), showed that new build homes are becoming more airtight.

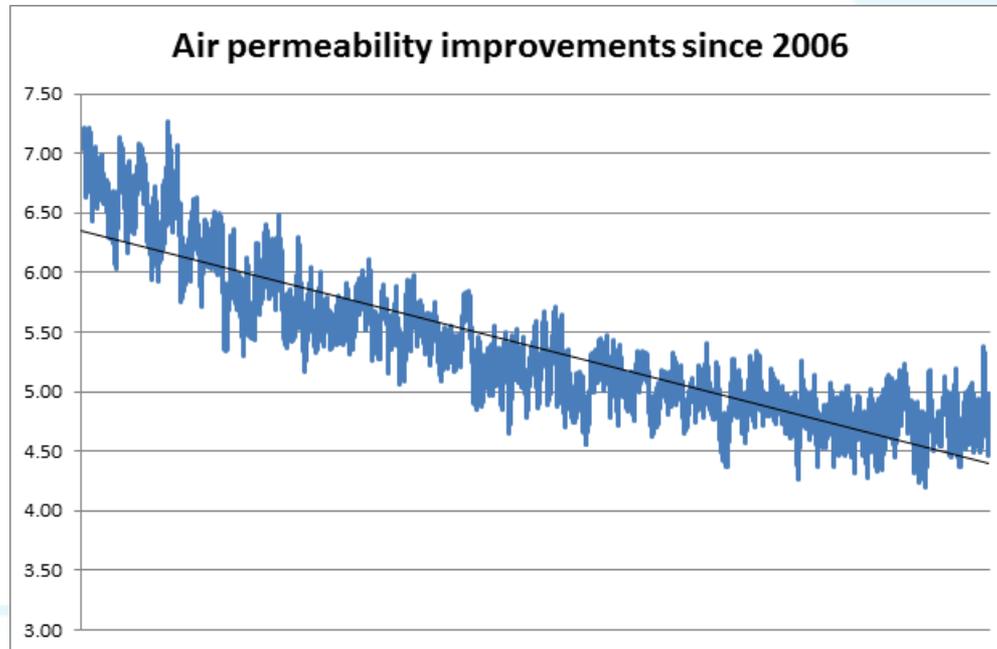
This necessitates the following strategy:

BUILD TIGHT VENTILATE RIGHT



Levels of Air Tightness in New Dwellings

A review of air tightness test data showed that dwellings were becoming more airtight. Dwellings were often significantly lower than the design air permeability



Approved Document: Building Regulations

Part F – Means of Ventilation



Part F Building Regulations state:

All fixed mechanical ventilation systems, where they can be tested and adjusted, shall be commissioned and a commissioning notice given to the Building Control Body.

For mechanical ventilation systems installed in new dwellings, air flow rates shall be measured on site and a notice given to the Building Control Body. This shall apply to intermittently-used extract fans and cooker hoods, as well as continuously running systems.

4.12 It is important to minimise the uncontrollable *infiltration* and supply sufficient *purpose-provided ventilation*. *Air tightness* measures to limit *infiltration* are covered in Part L of the Building Regulations and its supporting Approved Documents. Approved Document F recommends methods of achieving sufficient *purpose-provided ventilation*, allowing for a reasonably high level of *airtightness*.



ONLINE VERSION
 HM Government

The Building Regulations 2010

Ventilation

F

APPROVED DOCUMENT

F1 Means of ventilation

Coming into effect 1 October 2010

ONLINE VERSION

2010 edition
 incorporating further
 2010 amendments

Table 5.1a Extract ventilation rates

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

Table 5.1b Whole dwelling ventilation rates

	Number of bedrooms in dwelling				
	1	2	3	4	5
Whole dwelling ventilation rate ^{a, b} (l/s)	13	17	21	25	29

Notes:

- a. In addition, the minimum ventilation rate should be not less than 0.3 l/s per m² of internal floor area. (This includes all floors, e.g. for a two-storey building add the ground and first floor areas.)
- b. This is based on two occupants in the main bedroom and a single occupant in all other bedrooms. This should be used as the default value. If a greater level of occupancy is expected add 4 l/s per occupant.

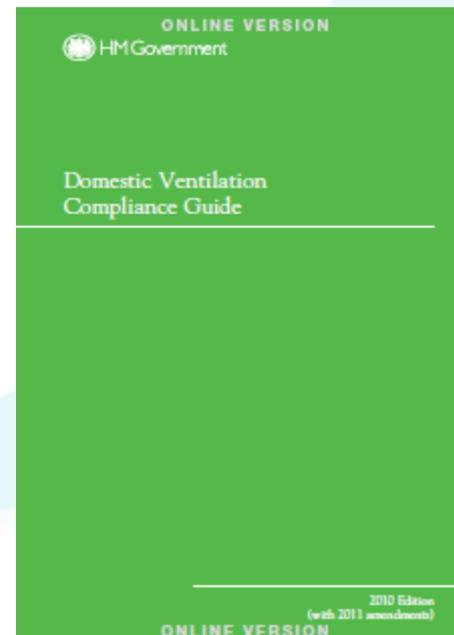
5.3 Demonstrating compliance

All three parts of the checklist and test sheet should be completed, with the relevant Parts 2 and 3 signed by a person who is responsible for the inspection and testing of the system that has been installed.

The three-part form needs to be completed for each installation address, and as a minimum a copy of Part 3 should be submitted to the BCB as evidence the installation has been correctly tested and commissioned (as relevant to the system installed).]

Part 3 – Air flow measurement test and commissioning details

3.1 Test Equipment				
Schedule of air flow measurement equipment used (model and serial number)			Date of last UKAS calibration	
1.				
2.				
3.				
3.2 Air Flow Measurements – System 1 only				
Fan Reference (as 1.2)	Measured Extract Rate (l/s)	Design Extract Rate (l/s) Refer to Table 5.1a in ADF		
Extract Fan 1				
Extract Fan 2				
Extract Fan 3				
Extract Fan 4				
Extract Fan 5				
<i>For kitchen extract canopies, only the highest setting needs to be recorded.</i>				
3.3 Air Flow Measurements (Extract) – Systems 3 and 4 only				
Room Reference (location of terminals)	Measured Air Flow High Rate (l/s)	Design Air Flow High Rate (l/s)	Measured Air Flow Low Rate (l/s)	Design Air Flow Low Rate (l/s)
Kitchen				
Bathroom				
En Suite				
Utility				
Other...				
Other...				
Other...				



F1 (1) – There shall be adequate means of ventilation provided for people in the building



4.2 The key aim of the requirement of Part F1(1) is that a ventilation system is provided that, under normal conditions, is capable of limiting the accumulation of moisture, which could lead to mould growth, and pollutants originating within a building which would otherwise become a hazard to the health of people in the building

4.3 In general terms, the requirement may be achieved by providing ventilation systems which:

- a. extracts, (before it is generally widespread), water vapour from areas where it is produced in significant quantities
- c. rapidly dilutes, when necessary, pollutants and water vapour
- d. makes available over longer periods a minimum supply of outdoor air for occupants and disperses, where necessary, residual pollutants and water vapour



Part F Building Regulations

2006 - Air tightness testing introduced in to Building Regulations

2006 – 2010 Air tightness levels lower than expected, raising concerns over IAQ

Build Tight ✓ Ventilate Right ?

2010 - Introduction of performance testing on Ventilation Systems, Part F

2010 – 95%+ failure rate

2010 – Concerns over measurement methods

2010 – Amnesty started

2013 – Measurement methods clarified

2014 – Amnesty ended



Part F Building Regulations

Initial tests demonstrated that >95% of dwellings failed to comply with Building Regulations requirements. Typical failure issues were:

Kinked/restricted ductwork

High resistance terminals in use

Undersized fans – fans incapable of achieving flow rate even in free air

Undersized fans – fans not suitable for length of ductwork

Incorrectly configured e.g. no or short over-run

Measurement instrumentation interfering with fan performance

Poorly installed systems

Installation Issues

There are a number of frequently encountered, potential installation issues that can compromise the system performance

2. Inflation/Deflation of the Duct



Installation / Testing Issues



There are many issues that contribute to the failings encountered in respect of the Installation and Testing of Residential Ventilation Systems.

- **Systems are very often installed by unqualified people**
- **Testing can be conducted by anyone. There is no requirement to be part of a CPS (Competent Persons Scheme)**
- **The equipment they use is not suitable:**
 - **The Test Instrumentation must be capable of achieving an accuracy of $\pm 5\%$**
(in order to achieve this, the unit must be calibrated with its hood and the coefficients resulting from the calibration must be used)
 - **It must be Calibrated by a UKAS accredited calibration laboratory and Calibrated on an annual basis**



Competent Testers

For the installation of Ventilation systems, the person undertaking the installation should have an understanding of the requirements and they should be a competent person in respect of the Installation of Ventilation Systems.

For compliance testing of Ventilation systems to Part F, the person undertaking the testing should have an understanding of the requirements and they should be competent in respect of Ventilation testing to Part F.

They must understand what test is required and how to conduct the test and use the correct calibrated Test Instrumentation.

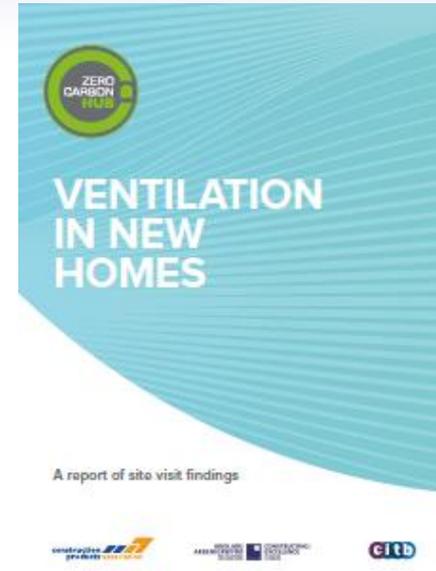
They really should have attended a BPEC Training course and have certification to prove this.

Installation / Testing Issues

A recent report by the Zero Carbon Hub (ZCH), reinforces BSRIA's own experience that most ventilation systems just don't perform. The question is why? To answer this we need to look at all elements of the process to understand how each one impacts the desired outcomes.

Design & Specifications – This is not usually the reason behind the issues with ventilation in dwellings, however it must go beyond specifying a fan(s) that claim to deliver the design flow rates. The design must be evaluated based on the entire system, its performance and relate to a practical installation.

Installation – Systems must be installed based upon the design and specification. Ideally the system should be installed by trained personnel familiar with Ventilation systems. Unfortunately, in the main, this is not the case.



Installation / Testing Issues

Commissioning of the system and Compliance Testing – This process should ensure that the system complies with the intended design outcomes. It should be line with the Domestic Ventilation Compliance Guide (DVCG) which includes a system installation and test record and this must be completed and reviewed. In many cases this document does not exist, or the reported figures are questionable.

Building Control should check that the system has been tested for compliance with the Part F Building Regulations and that a competent person has installed and tested the system and used calibrated test instrumentation.

It is a requirement for test equipment to be UKAS calibrated on an annual basis, however calibration laboratories report that it is estimated that less than 10% of test equipment has been calibrated in the previous 12 months

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Examples of Test Reports submitted to Building Control

Part 3 – Air flow measurement test and commissioning details

3.1 Test Equipment		
Schedule of air flow measurement equipment used (model and serial number)		Date of last UKAS calibration
1.	Testo 417 02307840	5 th April 2012
2.		
3.		

3.2 Air Flow Measurements – System 1 only		
Fan Reference (as 1.2)	Measured Extract Rate (l/s)	Design Extract Rate (l/s) Refer to Table 5.1a in ADF
Extract Fan 1	6.3	15
Extract Fan 2	6.8	15
Extract Fan 3	14.6	15
Extract Fan 4		
Extract Fan 5		

For kitchen extract canopies, only the highest setting needs to be recorded.

3.6 Test Engineer's Details	
Name	Steve Lewis
Company	Lewis (Rothwell) LTD
Address Line 1	The Orchards
Address Line 2	Leventhorpe Woodlford Leeds
Telephone Number	01132 822283
Post Code	LS26 8AG
Signature	<i>SLewis</i>
Competent Person Scheme/Registration Number (if applicable)	129848
Date of Test	15/5/13

Examples of Good Practice

The issues as previously detailed will be present on-site now and these will result in failures.

The installers must be made aware of good installation practice

Flexible ducting to be extended to 90% of its extended length

Total length and number of bends to be kept to a minimum and not exceed the fans limitations.

All connections between the fan, ducting and terminal must be sealed..

Ducting must be supported along its length to prevent sagging

All penetrations through the envelope must be sealed to prevent air leakage.
Air sealing must not restrict the ductwork.

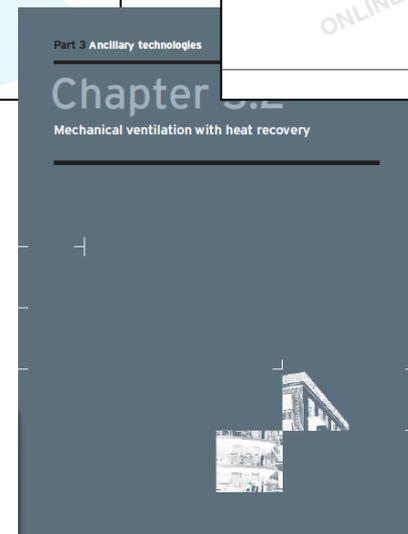
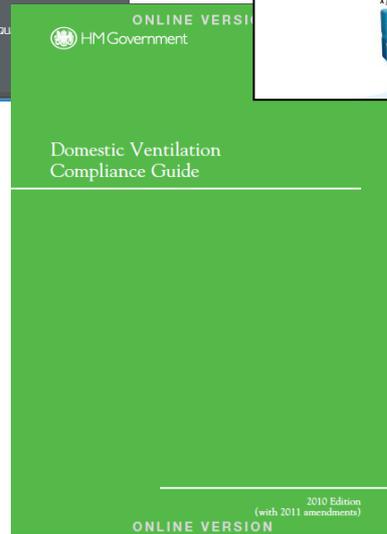
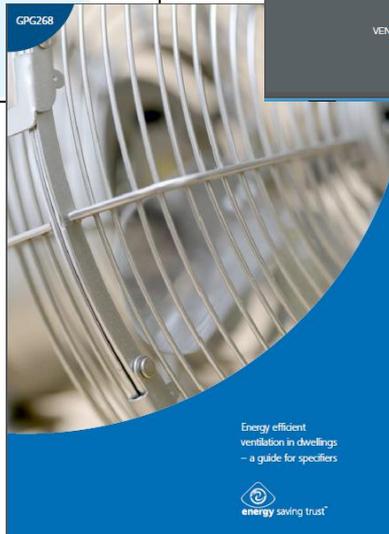
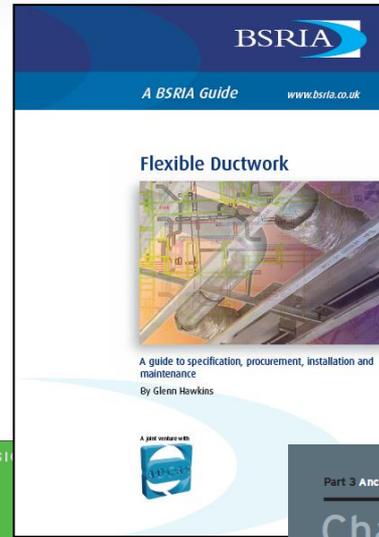
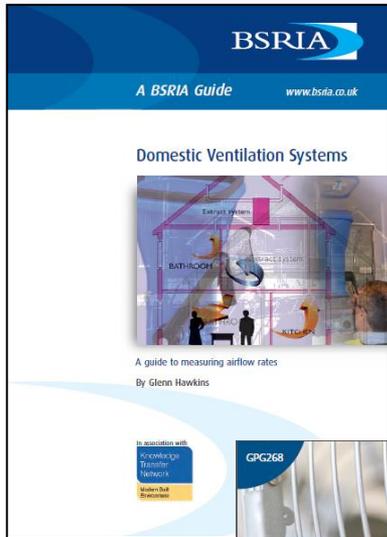
Penetrations through walls should be angled downwards to prevent water ingress

Vertical ducting will require a condensate trap to prevent moisture entering the fan

For any “soft” bends the inner radius of any bend must not be less than the duct diameter.

Any ducting running outside of the thermal envelope must be insulated.

Good Practice



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The Must Do's

- Suitable ventilation should be recognised as being Important & Essential
- Installation must be correct & conducted by Competent Persons.
- Performance Measured /Verified for Compliance.

Consequences

If this is not the case, there will be many Warranty issues and problems.



To Improve Ventilation Systems for New Build Dwellings

The following has to be implemented:

Installers of Ventilation Systems should be trained/qualified, be competent and know about ventilation systems.

Ventilations Systems should be independently tested/verified,(to ask the installer to verify the operation of the system they have installed), is questionable.

Ventilation systems should be tested with the right equipment, that is UKAS Calibrated.

Test and commissioning must be undertaken in line with the Approved procedures, results recorded and records logged. The test sheets must be reviewed to ensure that adequate ventilation rates have been achieved.

The current system being applied is failing. It is one based upon trust, a trust that is being abused and as a result the unknowing occupier is being subjected to a non-compliant property.

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Summary

We can see from the History of the Building Regulations Part F, that it has not been without its problems since its inception.

In recent years, there has been a marked increase in the use of mechanical ventilation systems in residential properties. This has led to the need to balance, Energy Efficiency, Environmental Impact and Occupant Wellbeing and consequently, means that there is an increased importance for getting the design, installation, inspection/testing and handover of these systems, Correct.

The UK Construction Industry has significant room for improvement in delivering appropriate quality Domestic Ventilation Systems.

Without well thought-out ventilation strategies and properly functioning systems, indoor air quality in dwellings will be compromised, potentially leading to health issues for the occupants and/or damage to the building fabric through condensation and mould.

BSRIA Compliance Services

BSRIA Compliance offers and provides a Single Source Solution for Ventilation Testing for Compliance with Building Regulations and Standards.

For New Builds, Domestic Dwellings and Commercial properties, where:

Ventilation Testing - for Compliance Testing on Part F Building Regulations, in England & Wales, section 3 Building standards in Scotland.

