



Quality of ventilation systems in residential buildings: Status and perspectives in the UK
18-3-2013

Presented by
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BSRIA

ABOUT BSRIA – BUILDING SERVICES RESEARCH AND INFORMATION ASSOCIATION

What?
Who?
Where?

Member based Association	Consultancy, test, instrumentation and research	Building services and construction industry
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**BUILDING REGULATION
COMPLIANCE TESTING**

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



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**AIRTIGHTNESS – PART L1
– KEY STATISTICS**

- 2011 – BSRIA tested approximately 8,500 domestic properties
- 2012 – BSRIA tested approximately 10,000 domestic properties
- 2013 – BSRIA will test approximately 13,500 domestic properties (= 25% total tested)



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UK HOUSING SECTOR – KEY STATISTICS (2011) – LAST FULL YEAR OF REPORTED DATA

- 135,000 dwellings completed
- 27.4 million total number of dwellings in UK = 17.4 million privately owned, 4.7 million privately rented, 2.7 million rented from housing authorities and remainder rented from local authorities

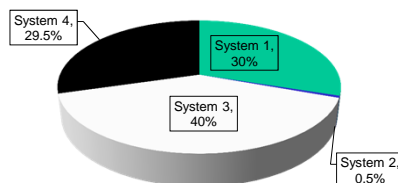


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VENTILATION – UK REGULATIONS PART F – KEY STATISTICS

Type	Description	Background (trickle) ventilation	Comments
System 1	Background ventilators and intermittent extract fans including single room heat recovery ventilators	Yes	Size as per tables in Regulations based on floor area and number of bedrooms
System 2	Passive stack ventilation (PSV)	Yes	As above
System 3	Continuous mechanical extract (MEV): centralised and de-centralised	Yes and No	Size as per tables in Regulations or if air permeability $>5\text{m}^3/(\text{m}^2)$ none is required
System 4	Continuous mechanical supply and extract with heat recovery (MVHR): centralised and single room	No	



Percentage mix of new build ventilation system types in 2011

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VENTILATION – UK REGULATIONS PART F – KEY STATISTICS

- In 2011 BSRIA tested less than **100** dwellings for airflow performance(completed systems and are post commissioning i.e. completed)
- In 2012 quantity increased to **500** dwellings
- In 2013 approximately **1000** dwellings will be tested for airflow performance



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VENTILATION – PART F – KEY STATISTIC (X40 RANDOM SAMPLE)

In 2011 **95%** of all dwellings when initially tested **FAILED** to meet the requirements contained in the Building Regulations. *In 2012 this high % improved but only a little !*



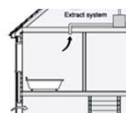
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VENTILATION – KEY FAILURE MODES (X40 RANDOM SAMPLE)

Value	Description
33 (82.5%)	Ductwork incorrectly fitted (kinked / bent / poor joints / excessive length)
10 (25%)	Undersized fans to meet the minimum ventilation requirement
6 (15%)	Insufficient fans or terminal outlets for dwelling type
3	No boost function
3	Incorrect installation data
2	Missing ductwork
1	Blocked ductwork

NOTE : Some dwellings had multiple failure modes



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VENTILATION – KEY FAILURE MODES

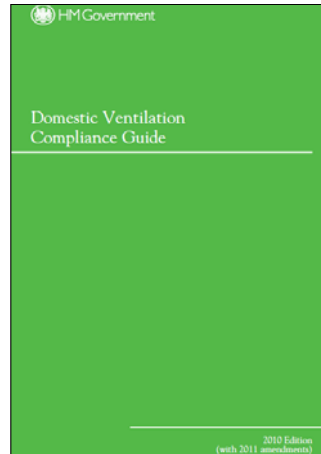
Poorly installed ductwork is without question one of the largest causes of systems not performing properly.



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UK DOCUMENTS



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APPROVED DOCUMENT F



There shall be adequate means of ventilation provided for people in the building” and “Fixed systems for mechanical ventilation and any associated controls must be commissioned by testing and adjusted as necessary”.

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DOMESTIC VENTILATION COMPLIANCE GUIDE

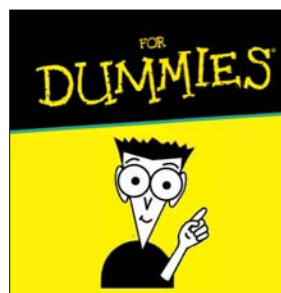
Covers installation and commissioning and copies of completed forms should be left in dwelling + submitted to the Building Control Body as evidence that the work has been correctly undertaken.



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WHAT NEXT ?



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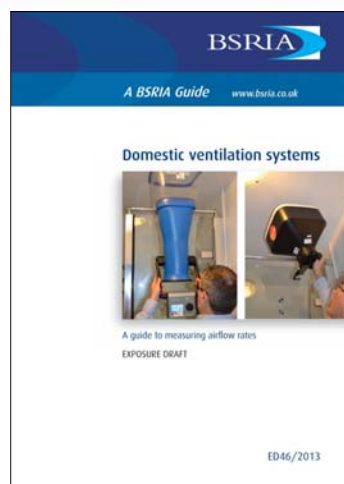


WHY DO WE NEED MORE GUIDANCE ?

The Domestic Ventilation Compliance Guide Section 5.2 states “Measurement of air flows should be performed using equipment that has been calibrated at a UKAS accredited calibration centre”.



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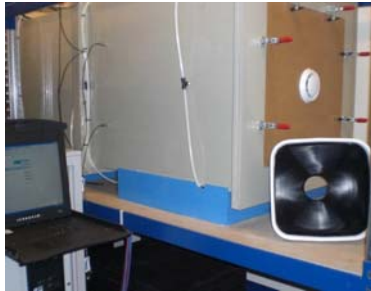
The aim of the guide is to improve the standard of domestic ventilation installations. In particular, it focuses on making sure that the methods used for measuring airflow rates are fit for purpose.

www.bsria.co.uk

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STEP 1

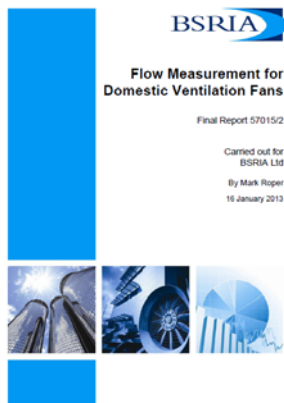


Laboratory investigation into the market leading vane anemometer & hood assembly measurement accuracies

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STEP 2



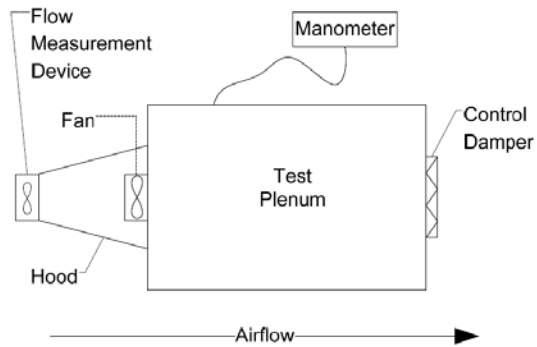
Laboratory investigation into various instruments and how they influenced the performance of typical fans in the marketplace

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STEP 2 – TEST SET-UP

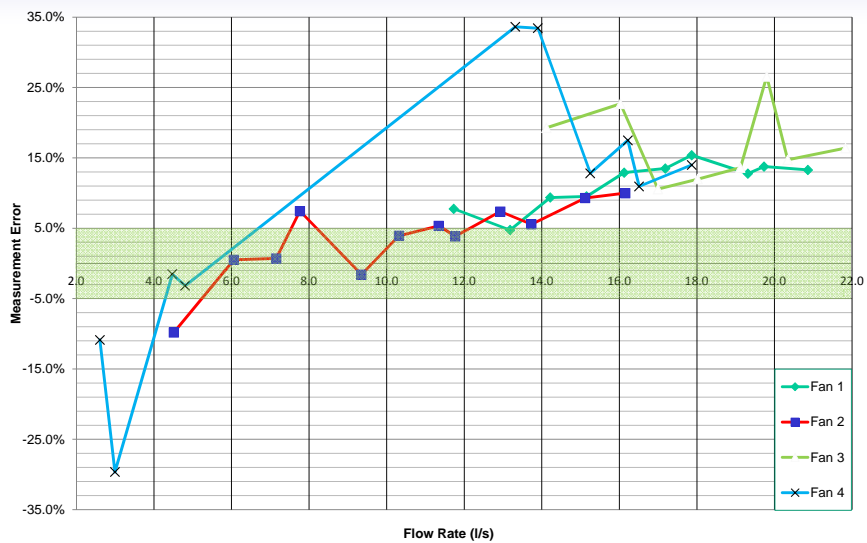
Figure 1 Test Rig Schematic



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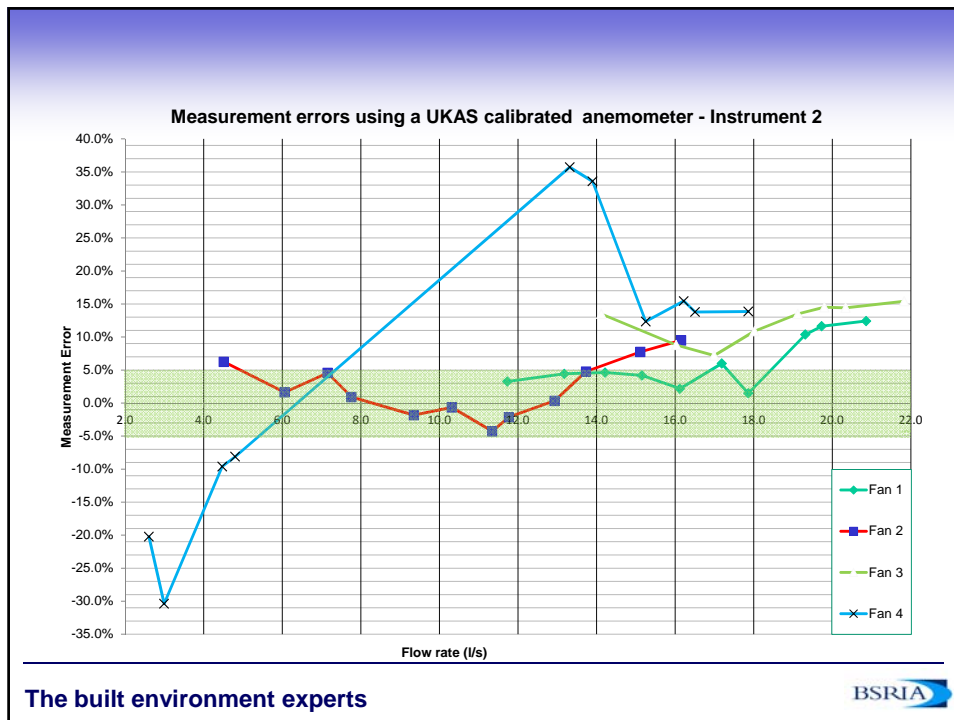


Measurement errors using a UKAS calibrated anemometer - Instrument 1



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THE UNCONDITIONAL METHOD - THE PREFERRED METHOD -

- Free from site-specific conditions such as fan type and model, airflow direction and instrumentation characteristics
- Uses a powered hood assembly to eliminate back pressure and turbulent flow effects
- Devices based on a zero-pressure method



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THE CONDITIONAL METHOD

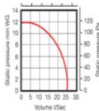
Must take into account specific site conditions such as fan performance characteristics, the resistance to airflow created by the measuring device, correction and conversion factors depending on the instrument used. **This information is currently not available !!!!!**



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THE CONDITIONAL METHOD



VIDEO AT www.bsria.co.uk

True air volume
=
corrections for the
anemometer + hood
+ fan system

=

Lots of unknowns
especially in
centralised fan
systems with
multiple grilles

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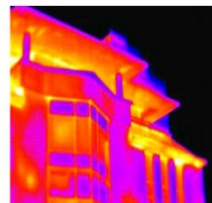
VENTILATION – A FUTURE KEY STATISTIC ?

In 2014 **95%** of all dwellings when initially tested **PASSED** the requirements contained in the UK Building Regulations.



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