

**Evidence of Mechanical Flow Rate Testing—Testing of Fixed Fans****Purpose**

BCA Technical Guidance notes are for the benefit of its members and the construction industry, to provide information, promote good practice and encourage consistency of interpretation for the benefit of our clients. They are advisory in nature and in all cases the responsibility for determining compliance with the requirements of the Building Regulations remains with the Building Control Body concerned.

This guidance note is based upon information available at the time of issue and may be subject to change.

**Introduction**

Regulation 42 of the Building Regulations 2010 requires builders to provide evidence of the testing of all fixed fans to the Building Control Body (BCB) within 5 days of the test being carried out. The Domestic Ventilation Compliance Guide (DVCG) published in 2010 gives the approved procedures for measuring air flows and reporting the results for Systems 1 to 4 described in Approved Document F 2010.

However, following the procedure for testing System 1 axial fixed fans using a vane anemometer has presented practical challenges. In particular, it has been shown that the resistance of the vane anemometer can adversely affect the test results, to the extent that a compliant fan may appear not to meet the recommended extract ventilation rates in Table 5.1a of Approved Document F. Builders have also found the description of the procedure to be unclear.

BCA have been working with industry and DCLG to devise a solution to these issues to allow the testing and reporting of fixed fans to be undertaken for all new dwellings.

**Key Issues**

The two key issues are –

- **Methodology** - The DVCG notes that the most common method for testing fixed fans is using a vane anemometer, or similar, placed in a hood covering the terminal. Although not intended by DCLG, 'terminal' has been interpreted by some as meaning the termination point of the fan, which can be difficult to access as it is likely to be outside the building at high level or at the ridge in the case of a roof terminal.
- **Presentation of Results** - Vane anemometers place a restriction on the air flow of the fan and the result can often be less than the rated output of the fan itself, especially if an axial fan is being tested.

This guidance note describes three methods which builders can follow to test, record and report the testing of fixed fans in order to demonstrate compliance with the requirements to satisfy the BCB and discharge their obligations under Regulation 42. The first two are only covered briefly as detailed guidance on these methods can be found in the BSRIA Document – Domestic Ventilation Systems - A guide to measuring airflow rates.

The third method uses the vane anemometer described in the DVCG. This note provides guidance on interpreting the results in the absence of the information on the fan output or performance curve required for Method 2.

**Guidance****Testing Location**

In the majority of cases the testing of fixed fans should be carried out at the terminal point within the room served by the fan.

Where the ventilation to a kitchen is provided via a cooker hood it may not be possible to carry out the test at the terminal point in the kitchen. In this case it may be reasonable to carry out the test on the outside of the dwelling, provided it can be done so safely. Where this is not possible, for example if it is above ground floor level, it would

be reasonable for the BCB to take a view on compliance taking account of the measured performance of the remaining fans in the dwelling.

### **Calibration of Equipment**

All testing equipment used should be correctly calibrated annually at a UKAS accredited laboratory. The information relating to the calibration should be entered onto the results sheet and should be available for the BCB if requested.

### **Testing Methods**

Any of these methods can be used to show compliance and the method used along with any additional information required to verify the result should be indicated on the results sheet.

#### **Method 1 – The Unconditional Method**

This measurement method uses a power flow hood which eliminates back pressure and places no additional restrictions on the fans being tested. The results shown on the equipment can therefore be taken as the correct performance of the fan.



#### **Method 2 – The Conditional Method**

This method allows a wide variety of testing equipment to be used including rotating vane anemometers, air capture hoods, thermal anemometers, thermal capture hoods, differential pressure anemometers and pressure pans.

Once the fan is tested, the reading is adjusted using a conversion factor specific to the fan make and model and the type of equipment being used. The conversion factors must be provided by the fan manufacturer and be based on third party testing by a UKAS accredited body. Copies of the results should be made available on request. It is important that the correct conversion factors are used and must in all cases be specific to the installed fan.

The record sheet needs to be completed with the following information –

- Fan make and model
- Test equipment
- Required output
- Measured output
- Specific conversion factor
- Adjusted output

#### **Method 3 – Minimum Benchmark Method**

This method can be used where the equipment in Method 1 is unavailable or the installed fan does not have the required conversion factors or performance curves required to adjust the measured results achieved with Method 2.

The test procedure is carried out as Method 1 and 2 using a vane anemometer fitted with a hood such as the one shown in the picture above. Minimum benchmark levels have been set which factor the impact of the test equipment. If the fan performance exceeds the minimum benchmark value indicated in Table 1 it would be reasonable for BCB's to assume that the fan is performing to the required level and accept the test results as showing compliance with Part F of the Building Regulations.

<b>Fan Rating</b>	<b>Minimum Benchmark Performance</b>
15 l/s	12 l/s
30 l/s	24 l/s
60 l/s	35 l/s

Table 1

If the results fall below the minimum benchmark values the following options are open to the builder –

- Check the installation has been carried out in accordance with the manufacturer's recommendations, that the correct rating of fan has been used and that there are no blockages or restrictions within any ducting.
- If the installation can be verified as being in accordance with the manufacturers recommendations the builder can retest the fans using Method 1 or 2 as these provide a more accurate means of measuring fan performance.

It should be noted that the presentation of results for any of the three methods described does not necessarily guarantee compliance. BCB's should use professional skill and judgement in ascertaining if an installation has been carried out correctly and in gauging if additional investigation is required.



# EVIDENCE OF MECHANICAL VENTILATION FLOW RATE TESTING - TESTING OF FIXED FANS

AIR FLOW MEASUREMENT (FIXED SYSTEM 1 FANS ONLY)								
Customer								
Dwelling address								
Test date								
TEST EQUIPMENT								
Air flow measurement equipment used (Please state model and type)								
Date of UKAS calibration		Certificate No.						
Model No.								
Test method used		Tick	Please refer to NHBC Guidance Note for further information on Methods					
Method 1 - unconditional method			Complete boxes (a), (b), (c), (d), (g) and (h)					
Method 2 - conditional method			Complete boxes (a), (b), (c), (d), (e), (f), (g) and (h)					
Method 3 - minimum benchmark method			Complete boxes (a), (b), (c), (d), (g) and (h) (15 l/s = 12 l/s), (30 l/s = 24 l/s) or (60 l/s = 35 l/s)					
AIR FLOW MEASUREMENTS								
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
Fan reference	Manufacturer	Model	Measured extract rate (l/s)	Fan correction factor	Corrected extract rate (l/s)	Design extract rate (l/s)	Pass/fail	Reason for failure
TEST ENGINEER'S DETAILS								
Name								
Company								
Address								
Tel								
Emails								

**Table 2—Record sheet for recording Air Flow Measurement Results**