

The image features a dark blue background on the left and a white background on the right, separated by a vertical line. The left side is decorated with a complex pattern of thin, yellow, curved lines that create a sense of motion and depth. The BRE logo is positioned on the blue background.

bre

**Air flow rate and
equivalent areas tests
on a 5" core drill vent
with anti-draught baffle
installed**

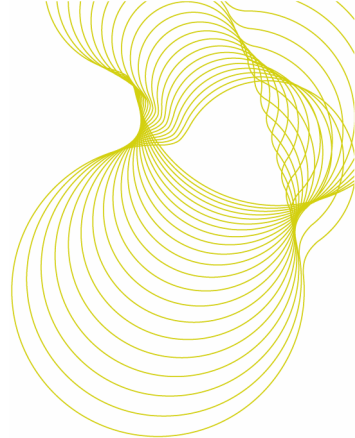
Prepared for: Mr. M. Reaney

Manthorpe Products Ltd

03 November 2007

Test report number 240 795

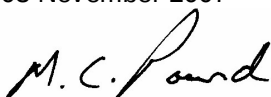
- 2 - Air flow rate and equivalent areas tests on a 5" core drill vent with anti-draught baffle installed



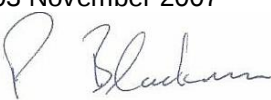
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Date 4 October 2007
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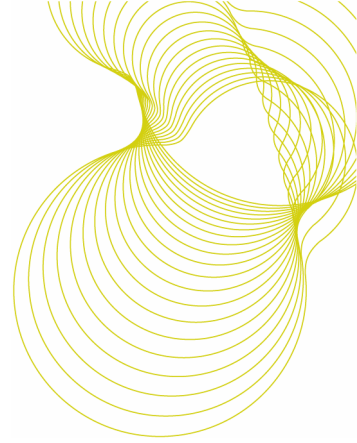
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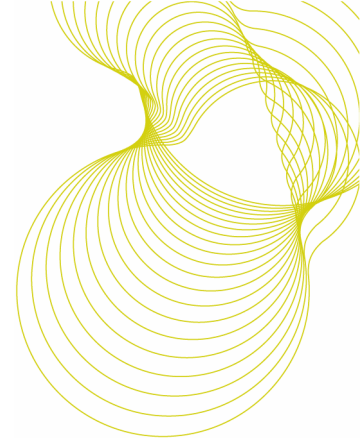
1 Introduction

At the request of Mr. M. Reaney of Manthorpe Building Products Ltd, Manthorpe House, Brittain Drive, Codnor Gate Business Park, Ripley, Derbyshire, DE5 3ND, BRE issued proposal 120949 on 19 September 2007. The client accepted this on 14 September and BRE tested specimens of the air vent on 04 October 2007.

The tests measure airflow rates through the specimen vent by using the method in BSEN 13141-1:2004¹ and the equivalent areas are calculated by using methods described in Annex A of that standard. The vent's performance and calculated equivalent area is also compared with a requirement in BS5440-2: 2000 Clause 5.2.1. That requirement is 5 cm² of free area of vent for every kW of appliance maximum rated input in excess of 7 kW.

The tests on the specimens were carried out under the BRE Standard Terms and Conditions of Business as part of BRE project number CV2113/Job Number 240795.

- 4 - Air flow rate and equivalent areas tests on a 5" core drill vent with anti-draught baffle installed



2 Details of tests, definitions and calculations

The test method for air flow measurement is from Clause 4 of *BS EN 13141-1:2004 Ventilation for buildings – Performance testing of components/products for residential ventilation – Part 1: Externally and internally mounted air transfer devices*.

The air flow test is performed by application of a series of test air pressure differentials across the specimen with measurement of the air flow rates through it at each pressure step. The maximum pressure differential was 10 Pa reached in pressure steps of 2, 4, 8, and 10 Pascals. A flow rate/pressure characteristics curve is plotted from the measured values.

Measurement of air flow through the specimen air vent was done by drawing air through it with the air pressure as positive on the outdoor face. The specimen to mounting board joint is fully sealed for tests.

The tests, measurements and calculations relate to the tested device with associated ducting, internal louvred plate and external cowl.

Definitions

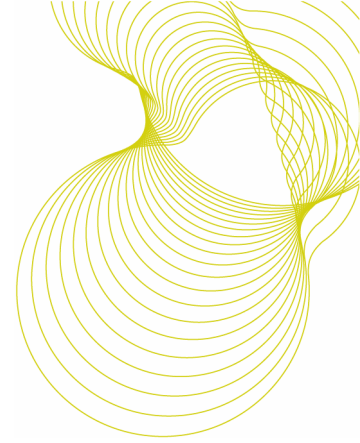
Externally mounted air transfer device – A device designed to allow the passage of air through the building envelope with the minimum ingress of rain, snow and foreign bodies.

Fixed device – Device without any moving part intended to control the air flow rate.

Equivalent area – Area of a sharp edged circular orifice which would pass the same air flow rate at the same applied pressure difference as the product being tested. This can be calculated from a method in Annex A in BS EN 13141-1:2004. Equivalent area A (in mm^2) is defined in relation with the air flow rate by the following formula:

$A = C \cdot q_v$ Where C is given in Table A1, Annex A in the standard and q_v is the volume flow rate measured through the device in litres per second at certain pressure differences.

Free area – Defined in the Building Regulations, Approved document F2 as the geometric open area of a ventilator. Note that Equivalent area has been introduced into the Approved document instead of free area for the sizing of background ventilators.



3 Air flow criterion

The Building Regulations, Approved document F², gives requirement for ventilation of rooms in buildings in terms of ventilation areas. It is therefore important to know how ventilation products perform in terms of air flow rates and the sizes of unobstructed areas available for ventilation.

The tests, measurements and calculations described herein show the characteristics of the air ventilator specimen under test.

Also considered was the BS5440-2: 2000 Clause 5.2.1 requirement for 5 cm² of free area of vent for every kW of appliance maximum rated input in excess of 7 kW. No 'free area' measurements were made. The equivalent area values calculated from airflow rates through the specimen vent were used as an indication of how its performance compares with the BS5440-2: 2000 Clause 5.2.1 requirement.

BS5440-2:2000 Clause 5.2.1 shall be considered in conjunction with other guidance and recommendations in that standard.

4 Test specimens – Manthorpe Building Products Ltd, 5" plastic core drill vent baffle (reversed)

The plastic baffle (designated Baffle 1 for these tests) is mounted on the end of a 120 mm internal diameter plastic duct. After installation of the baffle an external cowl and internal louvred plate are fixed over the exterior and interior ends, respectively, of the duct ends.

The air baffle is a fixed type (no adjustment) air transfer device. The duct has an overall internal area of 113.11 cm².

Figures in this report show the detail of the various parts of the ventilator.

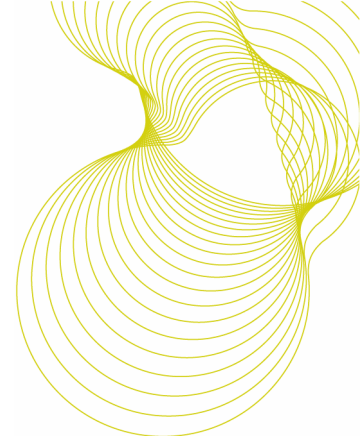
5 Test rig and preparation

The duct into which the specimen baffle and accessories fits is sealed into a mounting board that is in turn sealed to the test rig to form a test chamber with a low air leakage rate. Air is drawn from this chamber to establish the test pressure differential across the specimen under test and then leakage through the specimen is measured on an air flow meter.

The specimen was installed centrally in one face of the test chamber so that there was at least 300 mm to the inner edge of the chamber walls and at least 500 mm between the specimen and the efflux orifice in the chamber. The specimens are mounted in the test chamber wall with the exterior face of the device outside of the chamber.

The test specimens were conditioned before testing commenced for at least 4 hours within the temperature range specified in the test standard of 20 +/-5°C.

The air permeability of the test chamber and equipment is required by the standard to be lower than 1 litre per second (3.6 m³/h) at 100 Pa. Air permeability of the test chamber was within these limits and is discounted from the measurements of air flowing through the specimen and the test chamber/equipment.



6 Test results and calculations

The test results are given in Table 1 below.

Test pressure Pa	Air flow through the test specimen	Equivalent areas*		Approximate kW of appliance indicated by the calculated equivalent area
	L/sec	mm ²	cm ²	
2	8.72	7842.4	78.42	22.6
4	11.96	7607.9	76.08	22.2
8	16.69	7509.6	75.10	22.0
10	18.40	7405.3	74.05	21.8**

*BS EN 13141-1 gives values of C for these pressure differentials

** average of these four values is 22.15 kW

Table 1. Air flow rates through the reversed baffle No.1

7 Conclusions

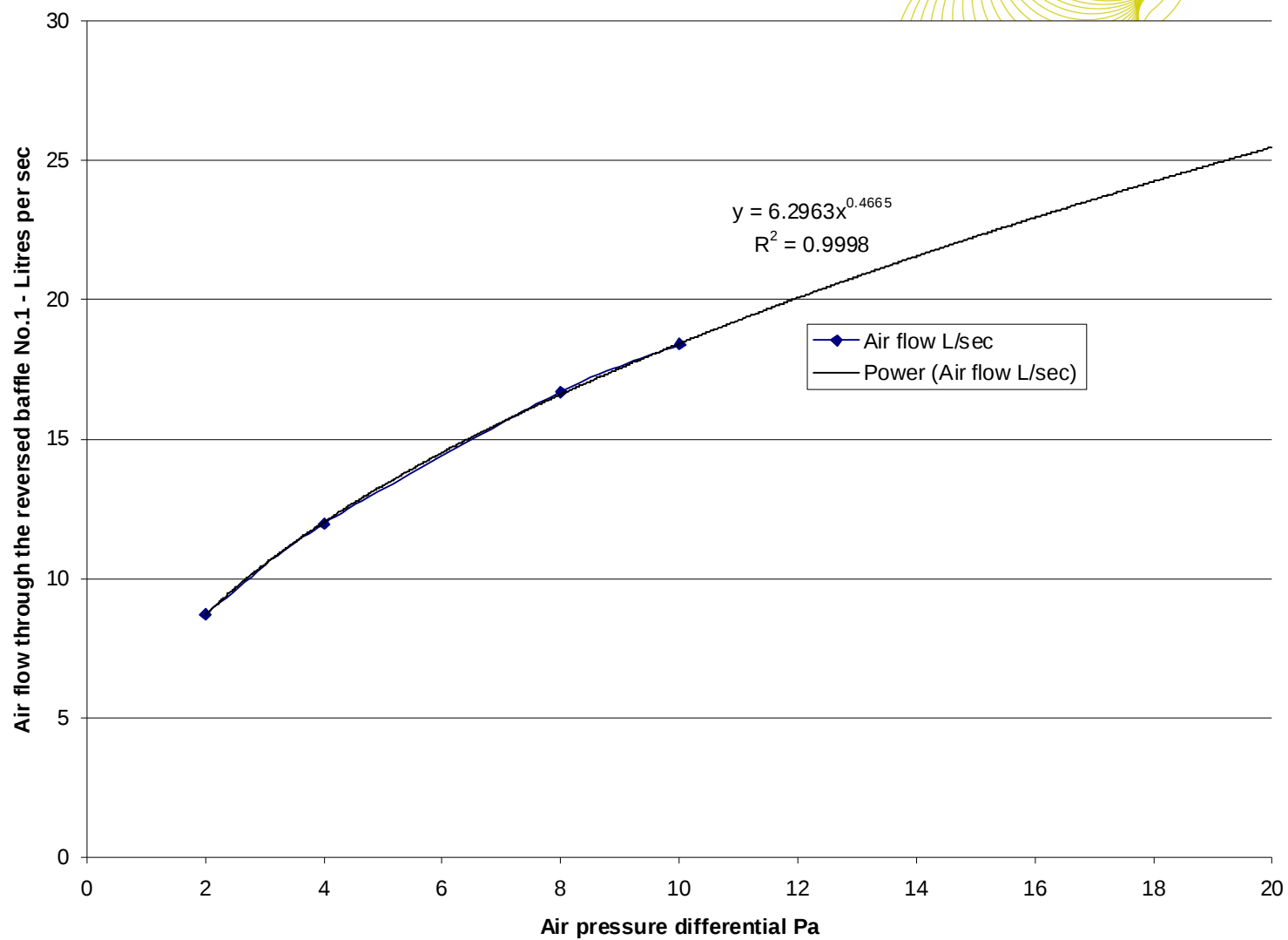
When the specimen reversed baffle No.1 air vent was tested in the manner described herein the results were:

- At test pressure differentials of 2, 4, 8 and 10 Pa the equivalent free areas calculated from the method in Annex A of BS EN 13141-1 were between 7400 mm² and 7850 mm².
- The average of the equivalent areas calculated at four pressure points was 7591.3 mm².
- Approximate kW of appliance indicated by the average of the calculated equivalent areas and the BS5440-2:2000 clause 5.2.1 requirement for the vent is 22.18 kW.

8 References

1. BS EN 13141-1:2004 Ventilation for buildings – Performance testing of components/products for residential ventilation – Part 1: Externally and internally mounted air transfer devices. BSI London.
2. BS 5440-2: 2000 Installation and maintenance of flues and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases) – Part 2: Specification for installation and maintenance of ventilation for gas appliances. BSI London.
3. Approved document Part F: Building Regulations 2000 Ventilation. Part F Means of Ventilation: 2006 edition. OPDM. NBS London UK.

- 7 - Air flow rate and equivalent areas tests on a 5" core drill vent with anti-draught baffle installed



- 8 - Air flow rate and equivalent areas tests on a 5" core drill vent with anti-draught baffle installed

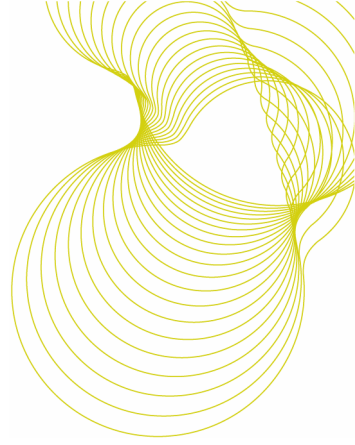


Figure 1. The indoor end of the duct with louvred ventilator plate fitted.



Figure 2. The outdoor end of the duct with cowl fitted

- 9 - Air flow rate and equivalent areas tests on a 5" core drill vent with anti-draught baffle installed

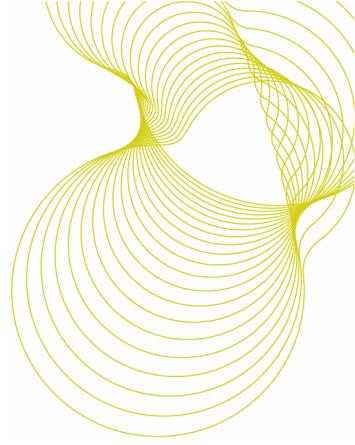


Figure 3. Baffle No 1 shown installed in the reversed position