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M60 836/18 nm/jre  
2006-06-14

## **Upholstery Fabric Kvadrat Type Steelcut**

**Determination of the  
air flow resistance according to EN 29053**

**Test Report No. M60 836/18**

Client:	Kvadrat A/S Lundbergsvej 10 8400 Ebeltoft Denmark
Consultant:	Dipl.-Ing. (FH) Andreas Niermann
Date of report:	14 June 2006
Date of test:	3 June 2006
Total number of pages:	In total 7 pages: 4 pages of text 2 pages of appendix A 1 page of appendix B

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## 1 Task

On behalf of Kvadrat A/S, DK-8400 Ebeltoft, the airflow resistance of the upholstery fabric Steelcut, make Kvadrat, is to be determined by measurements.

## 2 Test object and measurement conditions

For the specimen of the upholstery fabric Steelcut, make Kvadrat, the airflow resistance was to be determined. The data, e. g. name and type of the test object, were indicated by the client.

The fabric can be described as follows:

- Manufacturer: Kvadrat, DK-8400 Ebeltoft
- Designation: upholstery fabric type Steelcut
- Material: 90 % new wool, 10 % nylon
- Thickness of fabric: approx.  $d = 1.5$  mm
- mass per  $m^2$ : approx.  $m'' = 636$  g/ $m^2$

## 3 Execution of measurements

The measurements were carried out on 3 June 2006 in the Laboratory for airflow resistance measurements of the Müller-BBM company in Planegg.

The airflow resistance was determined according to EN 29053: 1993-03 "Acoustics – Materials for acoustical applications – Determination of airflow resistance".

The measurements for the determination of the airflow resistance were carried out at different air velocities. The continuous airflow method was applied. The measurement cell (specimen holder) has a diameter of 100 mm. The test specimen was fitted flat over the measurement cell, without stretching the material, sealed at the edges and fixed.

According to the standard the specific airflow resistance  $R_s$  and the airflow resistivity  $r$  are indicated as measurement results which were determined by extrapolation (linear regression) at an airflow velocity of  $u = 0,0005$  m/s.

#### 4 Measurement results

The determined airflow resistance values are indicated below. For further information regarding the measurements, see Appendix A.

The results of the measurements are:

$R_S$  = specific airflow resistance  
 $r$  = airflow resistivity

- Upholstery fabric Steelcut, make Kvadrat
  - $R_S = 1349 \text{ Pa} \cdot \text{s/m}$
  - $r = 8.82 \cdot 10^5 \text{ Pa} \cdot \text{s/m}^2$

#### 5 Remark

The present report may only be copied, disclosed or published as a whole including all appendices. The publication of extract requires the prior written consent of Müller-BBM.



Dipl.-Ing. (FH) A. Niermann

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DAP-PL-2465.10

**Determination of airflow resistance acc. to EN 29053**

<b>Project:</b>	Kvadrat		
<b>Test report no.:</b>	60836/18		
<b>tested by:</b>	nm		
<b>Date of measurement:</b>	2006-06-03		
<b>Number of specimen:</b>	5325		
<b>Construction:</b>	woven fabric, single layer		
<b>Designation:</b>	Steelcut		
<b>Material:</b>	90 % new wool, 10 % nylon		
<b>Purpose:</b>	upholstery		
<b>Thickness:</b>	1.5 mm	<b>Climatic conditions</b>	
<b>Surface:</b>	0.461 m <sup>2</sup>	<b>Absolute air pressure:</b>	101,3 kPa
<b>Mass:</b>	292.9 g	<b>Barometrical air pressure:</b>	96.2 kPa
<b>Area specific mass:</b>	636 g/m <sup>2</sup>	<b>Air temperature:</b>	21.5 °C
<b>Diameter:</b>	100 mm	<b>Relative air humidity:</b>	49.0 %

Number of measurement	pressure difference $\Delta p$ / mm H <sub>2</sub> O	air flow $q_v$ / (cm <sup>3</sup> /min)	air flow velocity $u$ / (m/s)	specific air flow resistance $R_s$ / (Pa s/m)	spec. air flow resistance rel. Length $r$ / (Pa s/m <sup>2</sup> )
1	10.000	34015	0.06855	1431.0	9.35E+05
2	9.500	32350	0.06519	1430.0	9.35E+05
3	9.000	31110	0.06269	1408.0	9.20E+05
4	8.500	29877	0.06021	1385.0	9.05E+05
5	8.000	28243	0.05692	1379.0	9.01E+05
6	7.500	26618	0.05364	1372.0	8.97E+05
7	7.000	24598	0.04957	1385.0	9.05E+05
8	6.500	22991	0.04633	1376.0	8.99E+05
9	6.000	20993	0.04231	1391.0	9.09E+05
10	5.500	19406	0.03911	1380.0	9.02E+05
11	5.000	17437	0.03514	1396.0	9.12E+05
12	4.500	15877	0.032	1380.0	9.02E+05
13	4.000	14333	0.02888	1359.0	8.88E+05
14	3.500	12428	0.02505	1371.0	8.96E+05
15	3.000	10555	0.02127	1384.0	9.05E+05

**Extrapolated acc. to EN 29 053:**

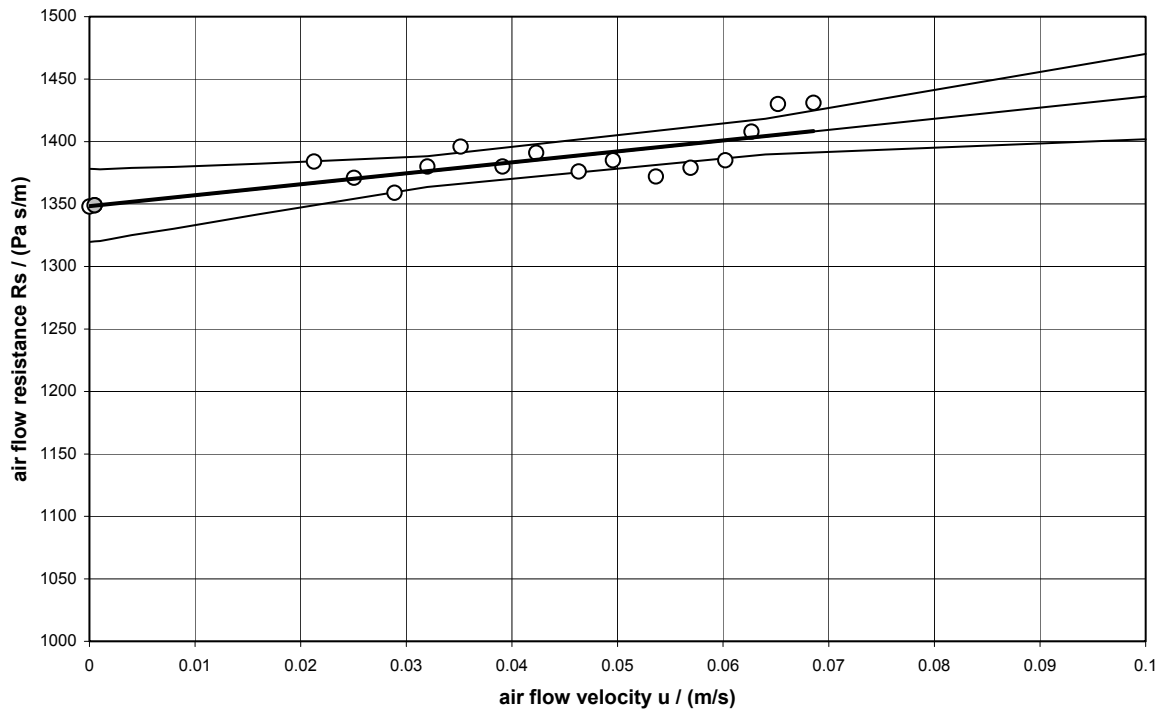
<b>0.0005</b>	<b>1349</b>	<b>8.82E+05</b>
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Statistical confidence: 95 %

Confidence interval  $u = 0,0005$  m/s:  $\pm 2.1$  %

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air flow velocity $u$ / (m/s)	specific air flow resistance $R_s$ / (Pa s/m)	spec. air flow resistance rel. Length $r$ / (Pa s/m <sup>2</sup> )
<b>0.0005</b>	<b>1349</b>	<b>8.82E+05</b>

**Extrapolated acc. to EN 29 053:**

Statistical confidence: 95 %

Confidence interval  $u = 0,0005$  m/s:  $\pm 2.1$  %

## List of test equipment

For the measurements and evaluations, the following test equipment was applied:

Name	Manufacturer	Type	Serial-No.
Mikromanometer	Furness Controls	FC O14 - MOS 220	9002407
Flow meter	BROOKS	Tube R-6- 15-B	--
Flow meter	BROOKS	Tube R-2- 15-C	--
Flow meter	BROOKS	Tube R-2- 15-A	--
Flow meter (4 pieces)	Kirchner & Tochter	KD 77/2 (air)	--
Measuring construction for airflow resistance	Müller-BBM	--	--
Computer with programs for evaluation	Müller-BBM	--	--