

Müller-BBM GmbH
Robert-Koch-Str. 11
82152 Planegg bei München

Telephone +49(89)85602 0
Telefax +49(89)85602 111

www.MuellerBBM.de

M. Eng. Philipp Meistring
Telephone +49(89)85602 228
Philipp.Meistring@mbbm.com

2018-08-02
M100827/164 MSG/STEG

Fabric Type Raas, Manufacturer Kvadrat A/S

**Determination of airflow resistance
according to EN 29053**

Test Report No. M100827/164

Client:	Kvadrat A/S Lundbergsvej 10 8400 Ebeltoft DENMARK
Consultant:	M. Eng. Philipp Meistring Juri Schwezow
Date of report:	2018-08-02
Delivery date of test object:	2018-06-29
Date of test:	2018-07-23
Total number of pages:	In total 7 pages, thereof 4 pages text, 1 page Appendix A, and 2 pages Appendix B.

Müller-BBM GmbH
HRB Munich 86143
VAT Reg. No. DE812167190

Managing directors:
Joachim Bittner, Walter Grotz,
Dr. Carl-Christian Hantschk, Dr. Alexander Ropertz,
Stefan Schierer, Elmar Schröder

Table of contents

1	Task	3
2	Basis	3
3	Test objects	3
4	Execution of measurements	3
5	Measurement results	4
6	Remarks	4

Appendix A: Measurement results and evaluation

Appendix B: Description of the test procedure and list of test equipment

1 Task

On behalf of Kvadrat A/S, 8400 Ebeltoft, Denmark, the airflow resistance of the fabric type Raas was to be determined according to EN 29053 [1].

2 Basis

This test report is based on the following document:

- [1] EN 29053: Acoustics – Materials for acoustical applications – Determination of airflow resistance. 1993

3 Test objects

The tested fabric is described in Table 1. The indicated characteristic values were determined by the testing laboratory on the basis of the sample delivered by the manufacturer.

Table 1. Test object.

Test object (manufacturer's information)	Area specific mass m' [g/m ²]	Thickness t [mm]
Fabric type Raas, manufacturer Kvadrat A/S, material: 92 % new wool, worsted / 8 % nylon	545	1.35

4 Execution of measurements

The airflow resistance was determined according to EN 29053 [1].

The test method, the test facility and the test equipment used are described in Appendix B.

5 Measurement results

For the tested curtain fabric type Raas a specific airflow resistance of


$$R_s = 2609 \text{ Pa} \cdot \text{s/m}$$

was determined.

The measurement results are shown in diagrams and tables in the test certificate in Appendix A of this report.

6 Remarks

The test results exclusively relate to the investigated subjects and conditions described.



M. Eng. Philipp Meistring
(Project Manager)



Juri Schwezow
(Responsible)

This test report may only be published, shown or copied as a whole, including its appendices. The publishing of excerpts is only possible with prior consent of Müller-BBM.



Durch die DAkkS Deutsche Akkreditierungsstelle GmbH
nach DIN EN ISO/IEC 17025 akkreditiertes Prüflaboratorium.
Die Akkreditierung gilt für die in der Urkunde aufgeführten Prüfverfahren.

EN 29053
Determination of airflow resistance

Client:: Kvadrat A/S
Lundbergsvej 10, DK-8400 Ebeltøft

Project Number:: M100827

Sample Number:: 13042

Test object: - fabric type Raas
- material 92% new wool, worsted / 8% nylon

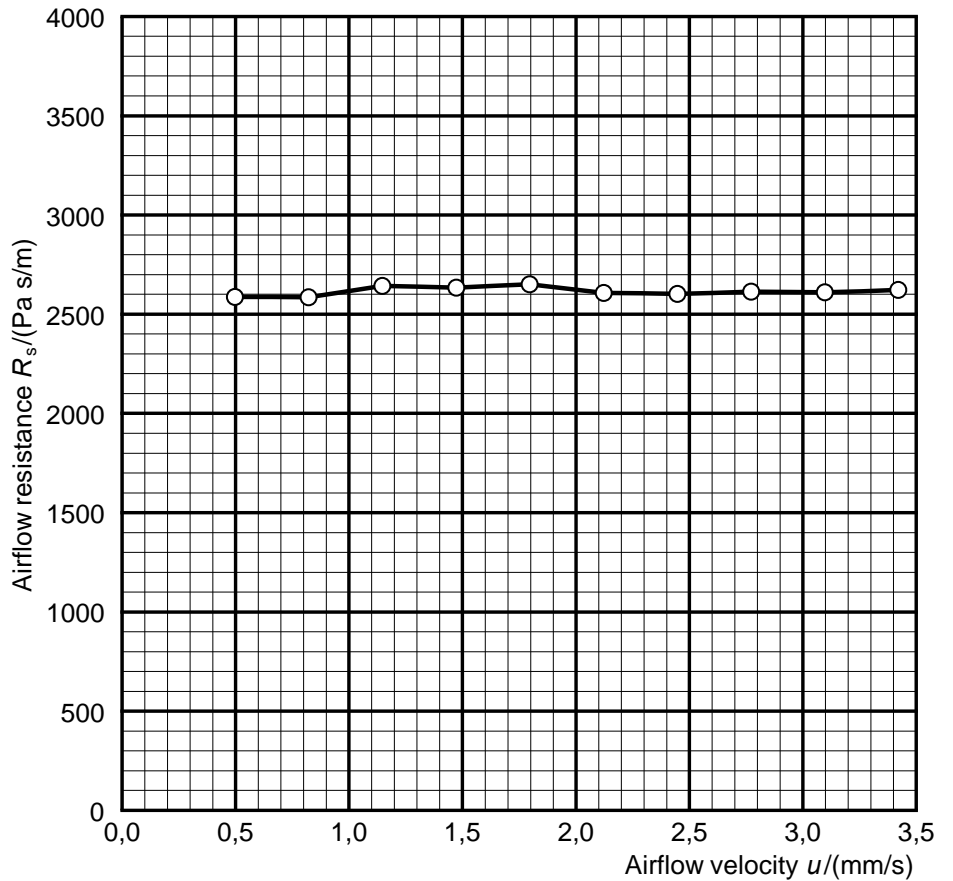
Diameter: 100 mm
Thickness: 1.35 mm
Area-specific mass: 545 g/m²

Barometric pressure:
 $B = 95,4 \text{ kPa}$

Temperature:
 $\theta = 27,8 \text{ °C}$

Relative humidity:
 $r. h. = 40,9 \%$

$u/$ (mm/s)	$R_s/$ (Pa s/m)
0.50	2587
0.82	2584
1.15	2641
1.47	2634
1.80	2650
2.12	2606
2.45	2601
2.77	2613
3.10	2609
3.42	2622



Airflow resistance $R_s = 2609 \text{ Pa s/m}$

Laboratory: Planegg
Responsible: Schwezow
Date: 2018-07-23

Description of the test procedure for the determination of the airflow resistance

1 Measurand

The specific airflow resistance R_S of the test object was determined. For this purpose the air pressure difference in front of as well as behind the test object was measured at different volumetric airflow rates. The specific airflow resistance $R_{S,i}$ for each volumetric airflow rate q_i determined was calculated using the following equation:

$$R_{S,i} = \frac{\Delta p_i A}{q_i}$$

With:

$R_{S,i}$ specific airflow resistance in Pa s/m

Δp_i air pressure difference across the test object with respect to the atmosphere in Pa

A cross-sectional area of the test object perpendicular to the direction of flow in m^2

q_i volumetric airflow rate passing through the test object in m^3/s

u_i linear airflow velocity in m/s

In addition, the linear airflow velocity u_i was determined:

$$u_i = \frac{q_i}{A}$$

The indicated measurement result is the specific airflow resistance R_S , which is calculated for an airflow velocity of $u = 0.0005$ m/s by extrapolation with help of the linear regression.

2 Test procedure

The direct airflow method (method A according to EN 29053) was applied. A steady unidirectional airflow with different airflow rates is pressed through the test object in the specimen holder. The resulting pressure drop between the two free faces of the test object is measured.

The specimen holder had a diameter of $D = 100$ mm.

3 List of test equipment

The test equipment used is listed in Table B.1.

Table B.1. Test equipment

Name	Manufacturer	Type	Serial-No.	Calibration valid until
Measurement system airflow resistance	Müller-BBM	M89319-00	315003	2020-03
Software for measurement and evaluation	Müller-BBM Acoustic Solution	m ars	1.9.6697.32125	
Digital measuring slide	Mitutoyo	CD-15PPR	07019377	2019-03
Electronic balance	Kern	KB1200-2N	W1402353	2019-03