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2020-09-29  
M100827/233 Version 1 MSG/STEG

## **Curtain fabric Ara 434 by Kvadrat A/S**

**Determination of airflow resistance  
according to DIN EN ISO 9053-1**

**Test Report No. M100827/233**

Client:	Kvadrat A/S Lundbergsvej 10 8400 Ebeltoft DENMARK
Consultant:	M. Eng. Philipp Meistring
Report date:	2020-09-29
Delivery date of test object:	2020-09-17
Date of test:	2020-09-23
Total number of pages:	In total 9 pages, thereof 4 pages text, 3 pages Appendix A and 2 pages Appendix B.

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## 1 Task

On behalf of Kvadrat A/S, 8400 Ebeltoft, Denmark, the airflow resistance of three samples of the fabric type Ara 434 was to be determined according to DIN EN ISO 9053-1 [1].

## 2 Basis

This test report is based on the following document:

- [1] DIN EN ISO 9053-1: Acoustics – Determination of airflow resistance – Part 1: Static airflow method (ISO 9053-1:2018); German version EN ISO 9053-1:2018. March 2019
- [2] DIN EN ISO 5084: Textiles - Determination of thickness of textiles and textile products (ISO 5084:1996); German version EN ISO 5084:1996. 1996-10

## 3 Test object

The tested fabric is described in Table 1. The indicated characteristic values were determined by the testing laboratory on the basis of three random samples (each 210 mm x 297 mm) from testing material delivered by the manufacturer.

Table 1. Test object.

Test object (information provided by the client)	Sample No.	Area specific mass $m''$ [g/m <sup>2</sup> ]	Thickness $t$ [mm]
Fabric type Ara 434, manufacturer Kvadrat A/S, material: 92% new wool, worsted / 8% nylon	1	366	1.01
	2	367	1.00
	3	367	1.02
	MEAN	367	1.01

The thickness of the fabric was determined acc. DIN EN ISO 5084 [2] (per sample mean value of three positions at one sample, pressure 1.00 kPa, pressure-foot 2,000 mm<sup>2</sup>).

## 4 Execution of measurements

The airflow resistance was determined according to DIN EN ISO 9053-1 [1].

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

## 5 Measurement results

The measurement results are shown in the diagram and table in the test certificates in Appendix A of this report.

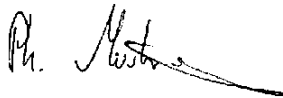
For the tested fabric the following specific airflow resistance was determined:

Table 2. Specific airflow resistance.

Test object Fabric type Ara 434	Specific airflow resistance $R_s$ / (Pa s / m)	Appendix A, page
Sample 1	481	1
Sample 2	491	2
Sample 3	486	3
MEAN	486	

## 6 Remarks

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



M.Eng. Philipp Meistring  
(Project manager)

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Testing laboratory accredited by DAkkS according to DIN EN ISO/IEC 17025:2018.  
The accreditation is valid only for the scope listed in the annex of the accreditation certificate.

**EN ISO 9053-1**  
Determination of airflow resistance

**Client:** Kvadrat A/S  
Lundbergsvej 10  
8400 Ebeltoft

**Project number:** M100827

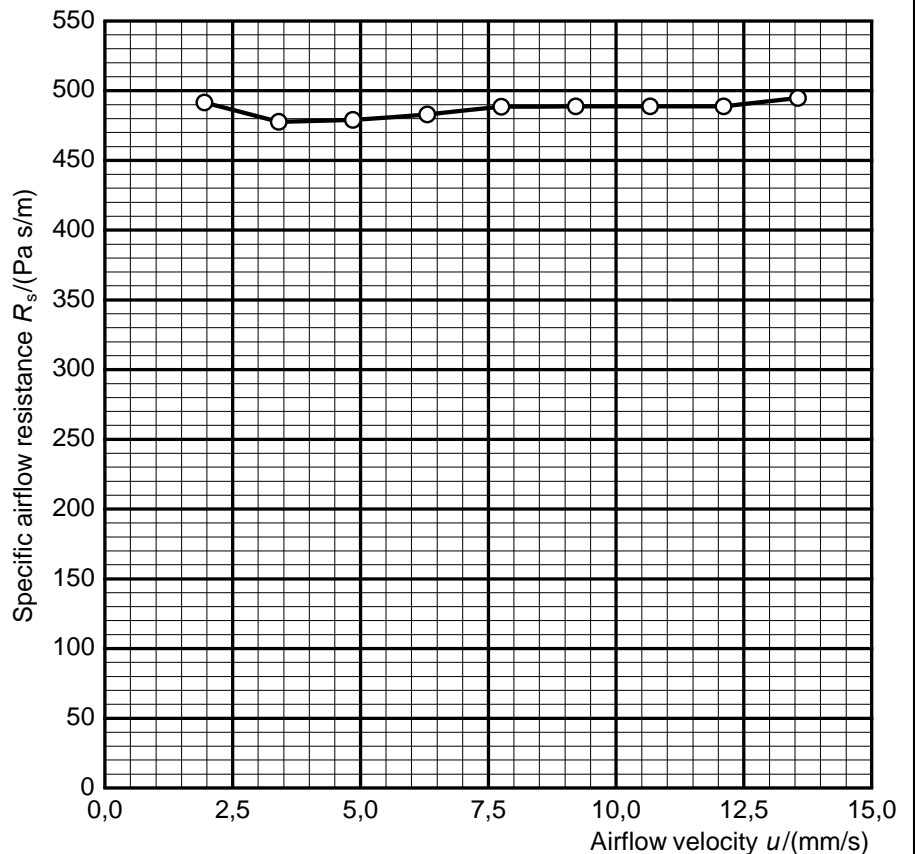
**Sample number:** 14020

**Test object:** - fabric: Ara 434  
- material: 92% new wool, worsted / 8% nylon  
(- sample 1/3)

Diameter: 100 mm  
Thickness: 1.01 mm  
Area-specific mass: 366 g/m<sup>2</sup>

Barometric pressure:  
 $B = 94,6 \text{ kPa}$   
Temperature:  
 $\theta = 25,6 \text{ °C}$   
Relative humidity:  
 $r. h. = 16,0 \%$

$u/$ (mm/s)	$R_s/$ (Pa s/m)
1.95	491
3.40	478
4.85	479
6.30	483
7.76	488
9.21	489
10.66	489
12.10	489
13.56	495



Specific airflow resistance  $R_s = 481 \text{ Pa s/m}$

**MÜLLER-BBM**

Laboratory: Planegg  
Responsible: Siegmüller  
Date: 2020-09-23

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**EN ISO 9053-1**  
Determination of airflow resistance

**Client:** Kvadrat A/S  
Lundbergsvej 10  
8400 Ebeltoft

**Project number:** M100827

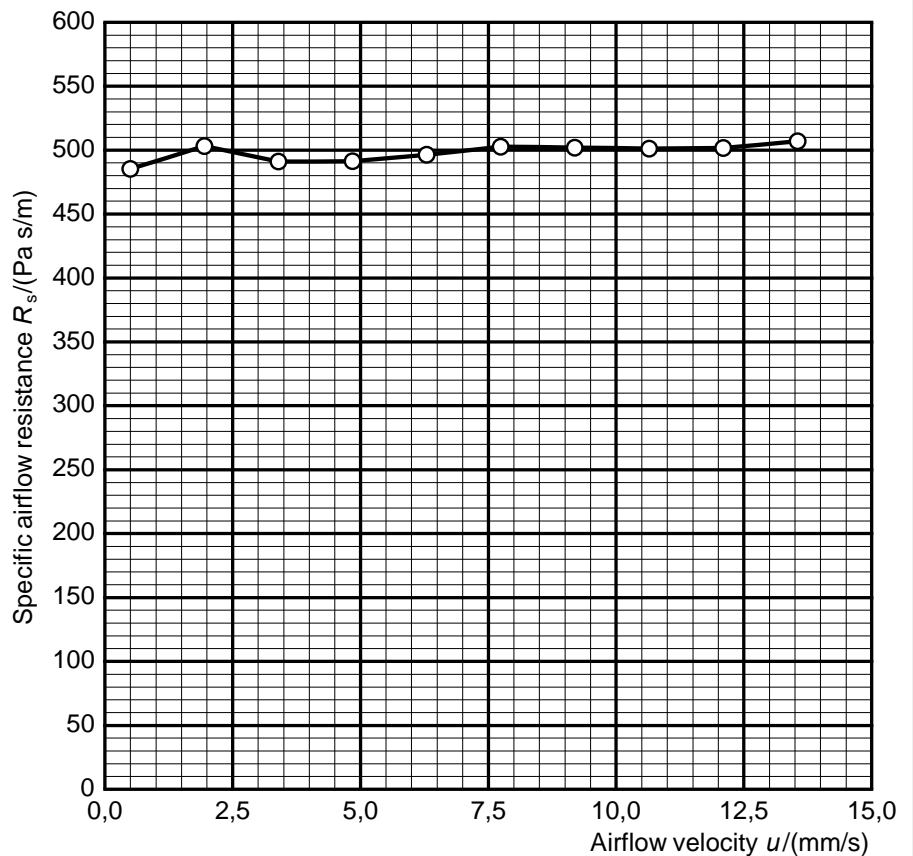
**Sample number:** 14020

**Test object:** - fabric: Ara 434  
- material: 92% new wool, worsted / 8% nylon  
(- sample 2/3)

Diameter: 100 mm  
Thickness: 1 mm  
Area-specific mass: 367 g/m<sup>2</sup>

Barometric pressure:  
 $B = 94,6$  kPa  
Temperature:  
 $\theta = 25,7$  °C  
Relative humidity:  
 $r. h. = 12,6$  %

$u/$ (mm/s)	$R_s/$ (Pa s/m)
0.50	485
1.95	503
3.40	491
4.85	491
6.30	496
7.74	503
9.19	502
10.64	501
12.10	502
13.55	507



Specific airflow resistance  $R_s = 491$  Pa s/m

**EN ISO 9053-1**  
Determination of airflow resistance

**Client:** Kvadrat A/S  
Lundbergsvej 10  
8400 Ebeltøft

**Project number:** M100827

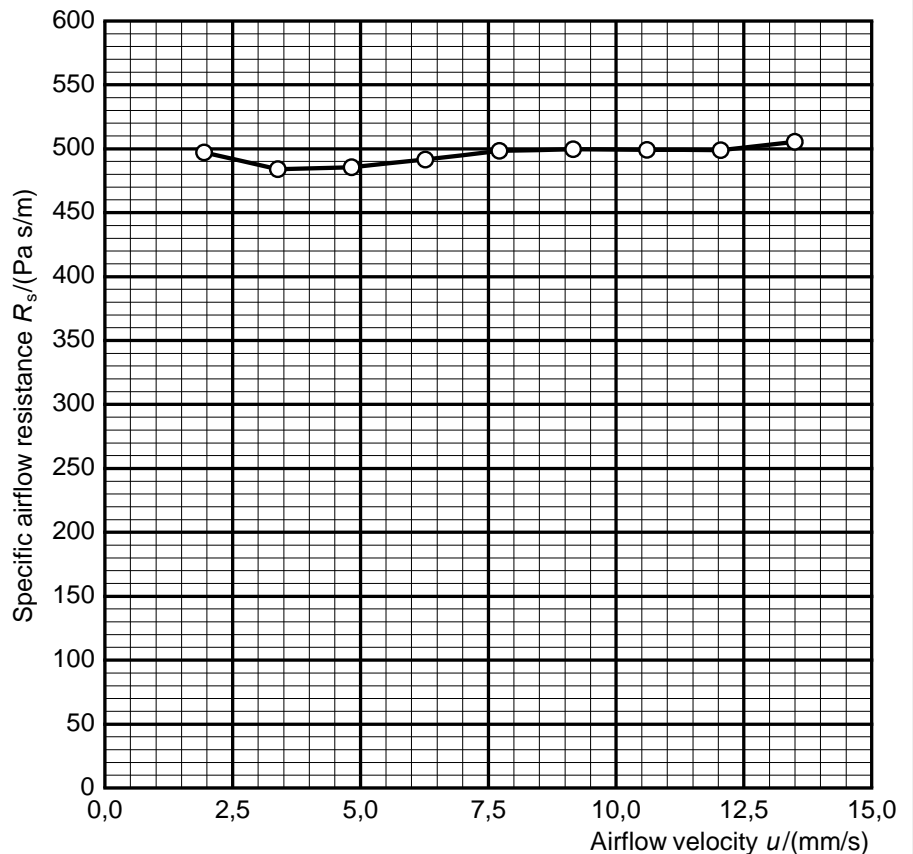
**Sample number:** 14020

**Test object:** - fabric: Ara 434  
- material: 92% new wool, worsted / 8% nylon  
(- sample 3/3)

Diameter: 100 mm  
Thickness: 1.02 mm  
Area-specific mass: 367 g/m<sup>2</sup>

Barometric pressure:  
 $B = 94,7$  kPa  
Temperature:  
 $\theta = 25,7$  °C  
Relative humidity:  
 $r. h. = 12,3$  %

$u/$ (mm/s)	$R_s/$ (Pa s/m)
1.94	497
3.38	484
4.83	485
6.27	492
7.71	498
9.16	499
10.60	499
12.05	499
13.49	505



Specific airflow resistance  $R_s = 486$  Pa s/m

**MÜLLER-BBM**

Laboratory: Planegg  
Responsible: Siegmüller  
Date: 2020-09-23

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## 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  $q_{v,i}$  determined was calculated using the following equation:

$$R_{S,i} = \frac{\Delta p_i \cdot A}{q_{v,i}}$$

With

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

$\Delta p_i$  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<sup>2</sup>;

$q_{v,i}$  volumetric airflow rate passing through the test object in m<sup>3</sup>/s;

$u_i$  linear airflow velocity in m/s;

In addition the linear airflow velocity  $u_i$  was determined:

$$u_i = \frac{q_{v,i}}{A}$$

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 (static airflow method according to DIN EN ISO 9053-1 [1]) was applied. A steady unidirectional airflow with different air flow 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	2022-06
Software for measurement and evaluation	Müller-BBM Acoustic Solution	m ars	Version 1.14.7256. 28813	
Thickness gauge	Hans Schmidt & Co GmbH	D-2000-C0913	2985	2021-06
Electronic balance	Kern	KB1200-2N	W1402353	2021-03