

Project number: M1-G381X-12049-2017/2-2

Topic number: -

TEST REPORT

Name of the product(s) and/or the test:	Ring rigidity and ring flexibility test of the pipes of the BlauFAST air duct system manufactured by Blauberg Ventilatoren GmbH
Applicant:	Blauberg Ventilatoren GmbH D-81379 München, Aidenbachstr. 52., Germany
Name of the test standard(s):	EN ISO 9969:2016 Thermoplastic plastic pipes. Determination of ring rigidity EN ISO 13968:2009 Plastic piping and drainage systems. Thermoplastic plastic pipes. Determination of ring rigidity
Place of the test:	ÉMI Non-profit Limited Liability Company for Quality Control and Innovation in Building Material Testing Unit 1113 Budapest, Diószei út 37.

13. 12.2017

The test results apply only to the individual tested.

The test report may be copied only in full volume without the written consent of Laboratory.

The expertise, interpretation and assessment indicated in the test report means an activity performed
in non-accredited status.

The report contains 7 numbered pages and 0 attachments.

Document-ID: KBiA-III-1.1-20170714_VJ

DK-A999X-14490-2018

1. DATA

- 1.1 Manufacturer of the product: Blauberg Ventilatoren GmbH
D-81379 München, Aidenbachstr. 52., Germany
- 1.2 Production site: Ventilation Systems, PrJSC
08150 Boyarka, Kyiv region, Sobornosty u. 36., Ukraine
- 1.3 Sampling related data: Sampling was made by the customer.

2. TESTS

Test conditions

- Date of the test: 12. 12.2017
- Relative humidity of the laboratory: 41%
- Temperature of the laboratory: 21°C
- Test was made by: Attila Bohák (Test technician)

Denomination, authentication and/or calibration results of the equipment, devices applied during the test:

Name of measuring gauge	Measuring range of the gauge	ID-number of gauge	Controlled state of the gauge
Universal tension-compression equipment	0-600 kN	41.	calibrated
Temperature and humidity meter	-50 - +70 °C 25-98 %	121.	calibrated
Digital calliper	0-300 mm	142.	calibrated

- 2.1. Determination of ring rigidity according to EN ISO 9969:2016 standard
- 2.2. Determination of ring flexibility according to EN ISO 13968:2009 standard.

3. RESULTS

3.1 Dimension control

The control of the dimensions (outer diameter, wall thickness) was made on 6 plaxes per specimen. The measurement data and the calculated inner diameters are shown in table no. 1:

Table no. 1

Specimen	Length [mm] (average of 3 measurements)	Outer diameter [mm]							Calculated inner diameter [mm]
		Wall thickness [mm]							
		1.	2.	3.	4.	5.	6.	Average	
1	298.9	74.56	74.55	75.23	74.91	74.87	74.70	74.80	63.19
		6.08	5.81	5.66	6.13	5.30	5.87	5.81	
2	299.4	75.23	73.89	75.26	75.09	73.59	75.12	74.70	63.14
		6.17	5.91	5.34	5.91	6.01	5.34	5.78	
3	300.2	75.71	74.13	74.54	74.94	74.43	74.98	74.79	63.40
		6.18	5.71	5.25	6.01	5.82	5.21	5.70	
4	301.6	62.86	62.92	62.97	62.97	62.97	62.68	62.90	51.90
		5.73	5.60	5.36	5.53	5.36	5.41	5.50	
5	301.3	63.01	63.05	63.10	62.91	63.30	62.82	63.03	52.00
		5.39	5.64	5.59	5.37	5.60	5.52	5.52	
6	302.2	62.98	62.92	63.05	62.90	63.07	63.01	62.99	52.00
		5.12	5.39	5.70	5.34	5.61	5.80	5.49	

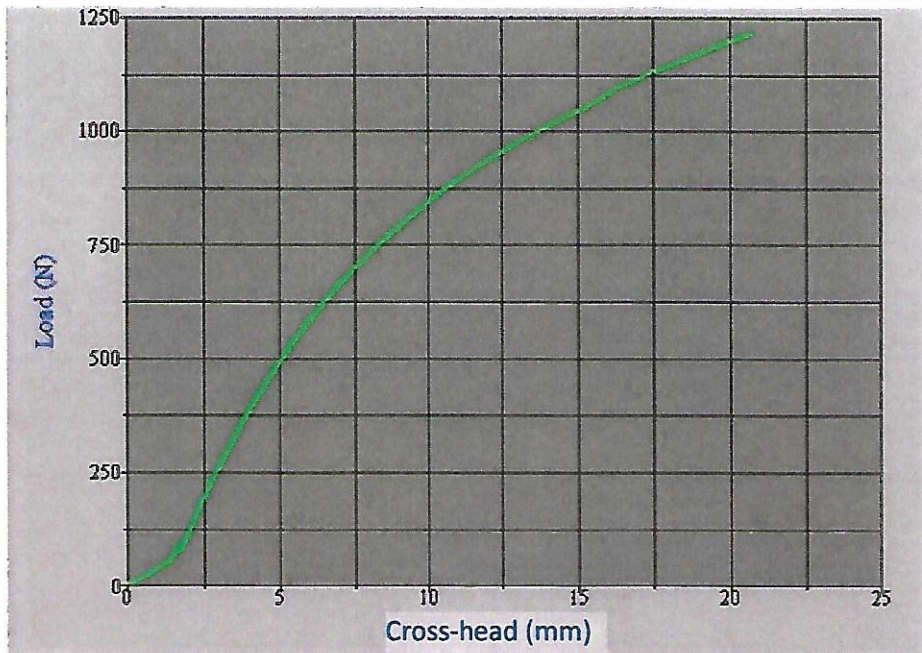
3.2 Ring rigidity and ring flexibility test

The tests were made on specimens subjected to dimension control; the specimens were loaded at an angle of „0° and „120° degrees, up to 3% compression, at a speed according to their diameter, then they were loaded at an angle of „240° degrees up to 30% compression, where we read also the ring rigidity value belonging to 3%-os compression. Test results are shown in table no. 2:

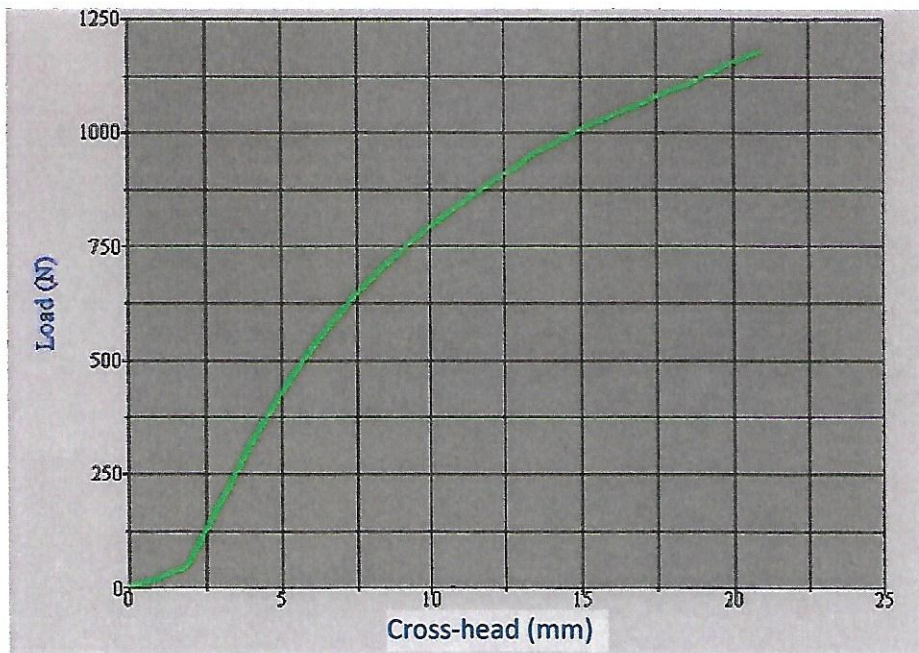
Table no. 2

Measurement ID	Measuring position	$F_{a,b,c}$ [N]	$\gamma_{a,b,c}$ [mm]	Ring rigidity [kN/m ²]	Average ring rigidity [kN/m ²]	Ring flexibility [N]
1/1	0°	282.7	2.06	8.917	4.95	–
1/2	120°	59.9	2.08	1.875		–
1/3	240°	129.4	2.08	4.050		1218
2/1	0°	45.6	2.07	1.426	3.85	–
2/2	120°	246.0	2.03	7.840		–
2/3	240°	74.0	2.10	2.291		1180
3/1	0°	75.0	2.08	2.335	4.71	–
3/2	120°	286.8	2.06	9.021		–
3/3	240°	89.6	2.09	2.779		1225
4/1	0°	304.7	1.72	11.417	12.02	–
4/2	120°	303.0	1.72	11.322		–
4/3	240°	357.1	1.73	13.328		1391
5/1	0°	318.8	1.73	11.893	11.90	–
5/2	120°	355.1	1.72	13.291		–
5/3	240°	281.5	1.72	10.530		1392
6/1	0°	338.4	1.73	12.558	12.86	–
6/2	120°	323.5	1.73	12.052		–
6/3	240°	373.6	1.72	13.973		1390

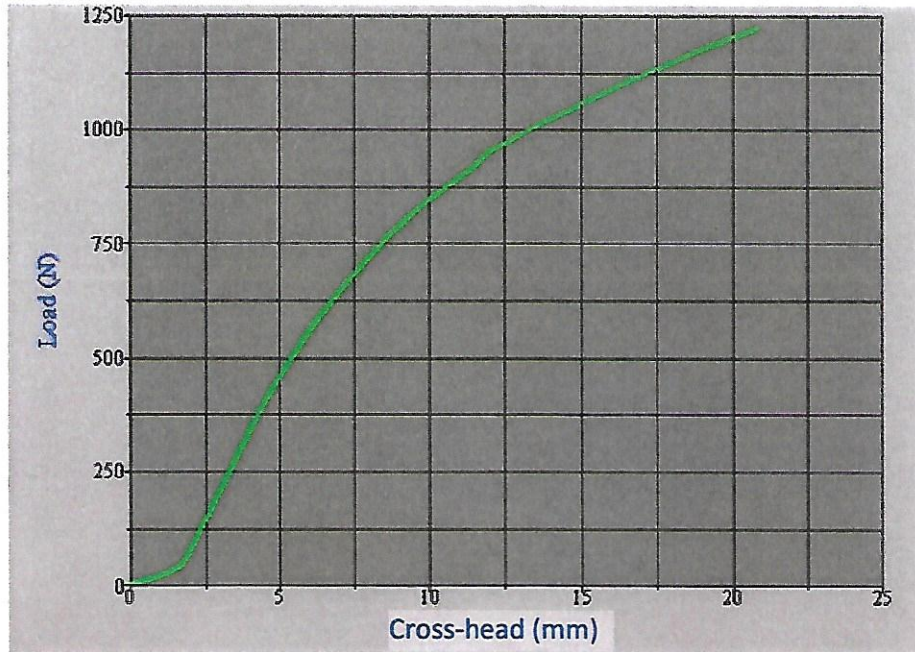
During the ring flexibility test the specimen die not brake and the force values were increasing continuously until the complete deformation (30%) was achieved, there is no significant drop in them. Refer to the pictures 1-6.



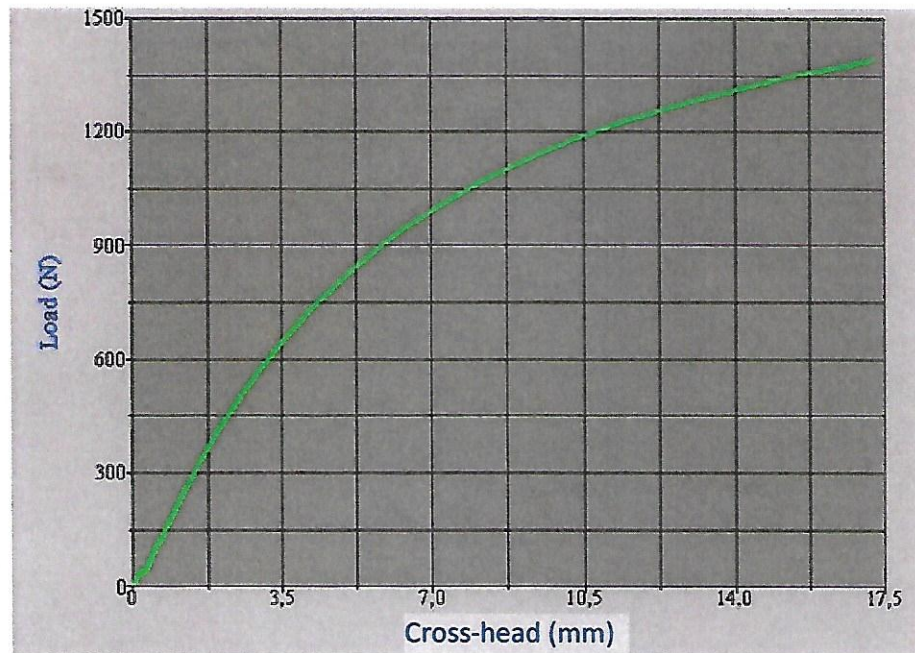
Picture no. 1: force-deflection diagram of the ring rigidity test of the specimen no. 1



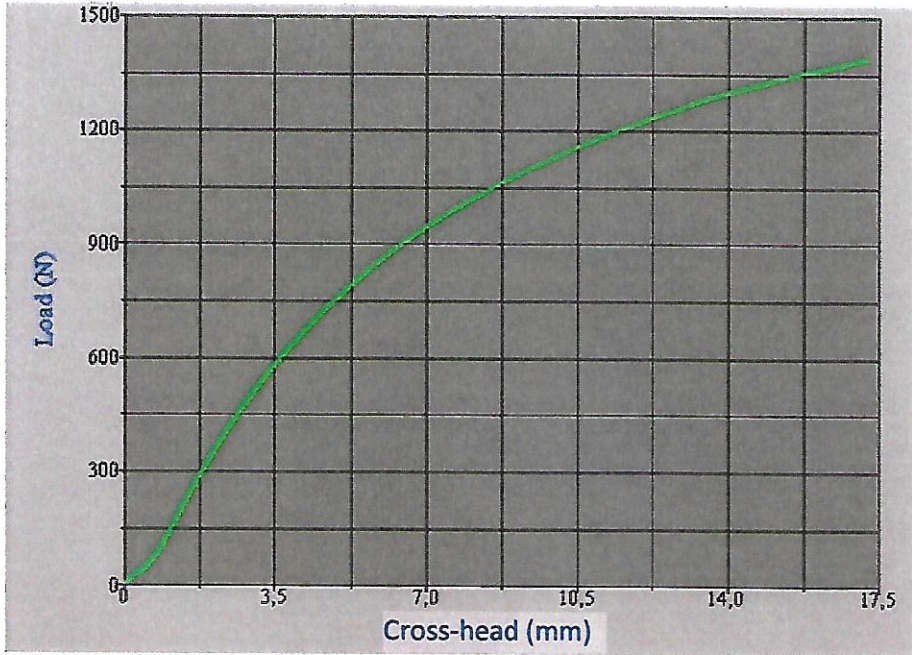
Picture no. 2: force-deflection diagram of the ring rigidity test of the specimen no. 2



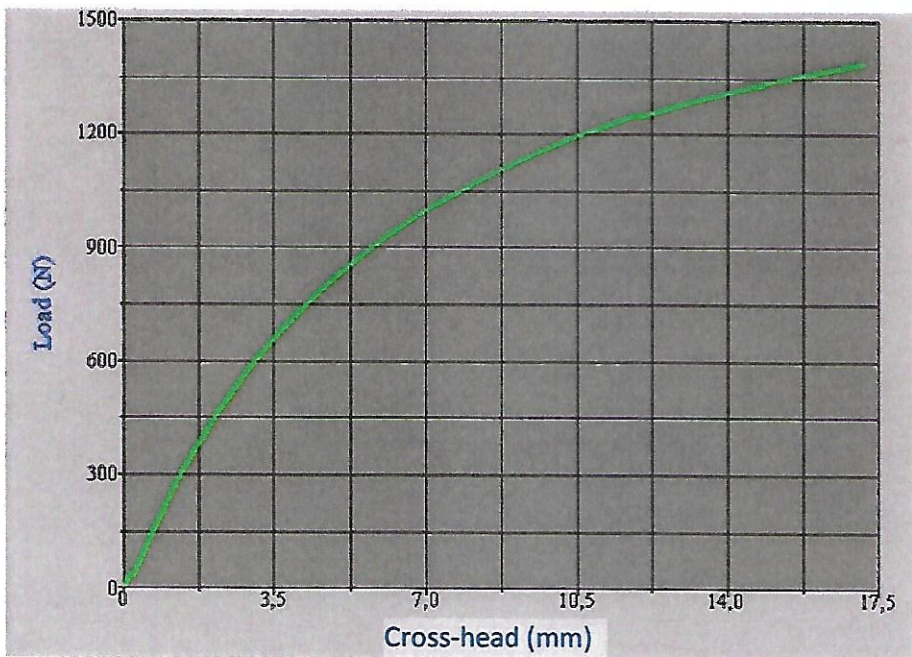
Picture no. 3: force-deflection diagram of the ring rigidity test of the specimen no.3



Picture no. 4: force-deflection diagram of the ring rigidity test of the specimen no. 4



Picture no. 5: force-deflection diagram of the ring rigidity test of the specimen no. 5



Picture no. 6: force-deflection diagram of the ring rigidity test of the specimen no. 6

4. DECLARATION

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5. ANNEXES

Budapest, December 13, 2017

Test made by:

Attila Bohák
Test technician

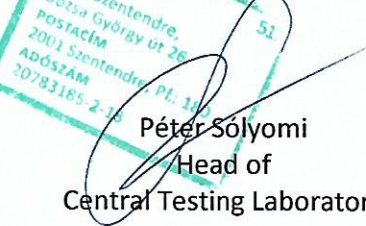
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51