Austrian Institute of Construction Engineering
Schenkenstrasse 4 | T +43 1 533 65 50
1010 Vienna | Austria | F +43 1 533 64 23
www.oib.or.at | mail@oib.or.at

Designated according to Article 29 of Regulation (EU) No 305/2011

Member of EOTA
www.eota.eu

Evaluation Report

Technical assessment body issuing the European Technical Assessment	Österreichisches Institut für Bautechnik (OIB)
Trade name of the construction product	**VentilFlex, VentilFlex-RKV**
Product family to which the construction product belongs	Liner, made of glass fibres, mineral and organic substances used for relining of ducts for ventilation purposes
Manufacturer	KOMPOZITOR, Plastics Developing Ltd. Széchenyi utca 60 H-2220 Vecsés Hungary
Manufacturing plant	KOMPOZITOR, Plastics Developing Ltd. Széchenyi utca 60 H-2220 Vecsés Hungary
This Evaluation Report contains	16 pages

Table of content

1 Technical description of the product

See EAD [1] and ETA, Clause 1.

Assessment of reduction of inner diameter of the liner in case of inclination up to 45° of **VentilFlex** and **VentilFlex-RKV** according to EAD [1], Clause 2.2.7, in order to evaluate the value of up to 15% in Clause 1.1 in the EAD [1] is given in test report [2a].

2 Specification of the intended use(s) in accordance with the applicable EAD

See EAD [1], Clause 1, Clause 1.2.1, and ETA, Clause 2.

Working life/Durability of the construction product

See EAD [1], Clause 1.2.2, and ETA, Clause 2.

As the manufacturer is confirming equivalence of the composition of both products [2b], for **VentilFlex** the assessment given for FuranFlex in ETA-12/0346, considering an even more onerous situation with regard to the intended use, applies. The equivalence of the materials is ensured by relevant data and checks in the control plans for both products.

For **VentilFlex-RKV** the difference to **VentilFlex** is detailed in Clause 1 in the ETA. Comparative assessment of abrasion of both products has been carried out [2d, 2e]. It shows similar amount of abrasion which is interpreted as equivalence in terms of working life [2f], taking into consideration appropriate conditions for cleaning as define in [2g].

3 Performance of the product and references to the methods used for its assessment

3.1 Performance of the product

3.1.1 Reaction to fire

Requirement

See EAD [1], Table 1 and Clause 2.2.1.

Assessment

Assessment of the liner **VentilFlex, Ventilflex-RKV** is done according to test reports [3, 4].
VentilFlex is classified as B-s2, d0 according to Commission Delegated Regulation (EU) No 2016/364 according to classification report [5].
VentilFlex-RKV is classified as A2-s1, d0 according to Commission Delegated Regulation (EU) No 2016/364 according to classification report [5]

3.1.2 Tightness

Requirement

See EAD [1], Table and Clause 2.2.2.

Assessment

For the circular cross-section of the liner **VentilFlex, VentilFlex-RKV**, the assessment of the tightness was tested on representative units according to EN 12237, Clause 7, referred in the test reports [6; 7]. Whereas, the test pressure (positive/negative) has been selected according to Table 2 of EN 12237. For the calculation of the surface area of the duct EN 14239 applies.

For the rectangular cross-section of the liner **VentilFlex, VentilFlex-RKV,** the assessment of the tightness was tested on representative units according to EN 1507, Clause 5, referred in the test reports [6; 7]. Whereas, the test pressure (positive/negative) has been selected according to Table 1 of EN 1507. For the calculation of the surface area of the duct EN 14239 applies.

The measurement results are listed in Table 3a to Table 3h in this Evaluation Report and in the test reports [6; 7].

Table 3a: Measurement results for circular cross-section of the liner **VentilFlex** in positive pressure mode [6]

No.	p^+_{test} Pa	$\dot{V}_{test}$ $\frac{dm^3}{s}$	$\dot{V}_{corr}$ $\frac{dm^3}{s}$	f_{test} $\frac{dm^3}{m^2s}$	f_{corr} $\frac{dm^3}{m^2s}$	$f_{max,D}$ $\frac{dm^3}{m^2s}$	$f_{max,C}$ $\frac{dm^3}{m^2s}$	$f_{max,B}$ $\frac{dm^3}{m^2s}$	$f_{max,A}$ $\frac{dm^3}{m^2s}$
1	100	0.122	0.118	0.010	0.010	0.020	0.060	0.180	0.539
2	200	0.212	0.206	0.017	0.017	0.031	0.094	0.282	0.845
3	300	0.299	0.290	0.024	0.023	0.041	0.122	0.367	1.100
4	400	0.387	0.376	0.031	0.030	0.049	0.147	0.442	1.326
5	500	0.465	0.451	0.038	0.036	0.057	0.170	0.511	1.534
6	750	0.637	0.618	0.051	0.050	0.074	0.222	0.665	1.996
7	1000	0.814	0.790	0.066	0.064	0.089	0.267	0.802	2.406
8	1250	0.977	0.948	0.079	0.076	0.103	0.309	0.927	2.782
9	1500	1.157	1.123	0.093	0.091	0.116	0.348	1.044	3.132
10	1750	1.305	1.266	0.105	0.102	0.128	0.385	1.154	3.462
11	2000	1.451	1.408	0.117	0.114	0.140	0.420	1.259	3.776
12	2250	1.613	1.565	0.130	0.126	0.151	0.453	1.359	4.076

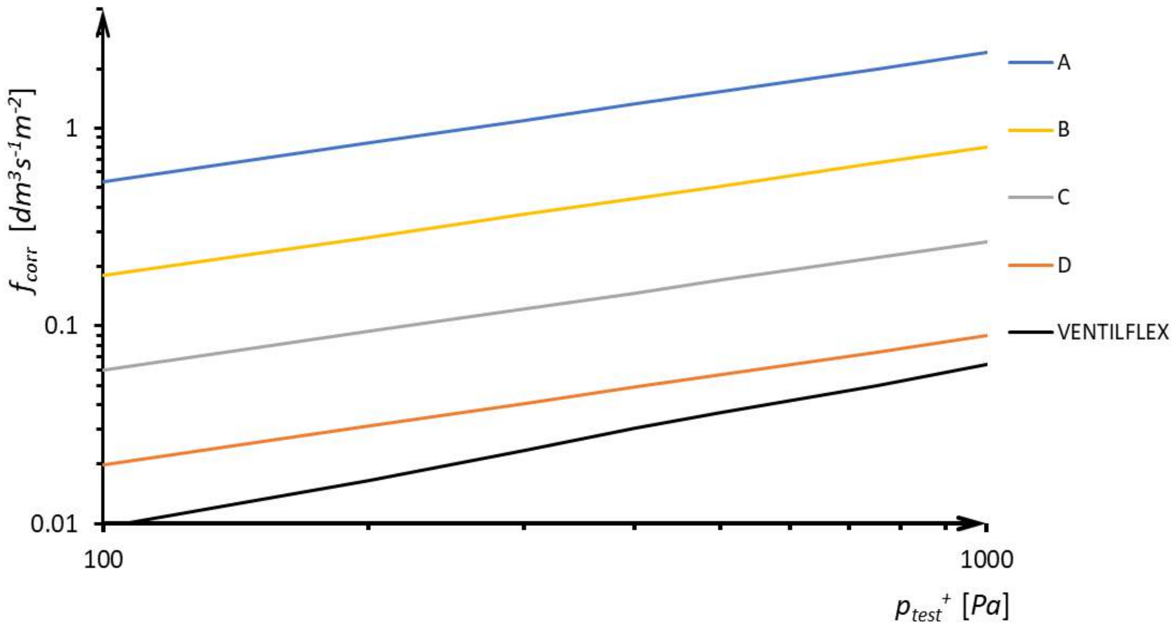

Figure 3a: Measurement results for circular liner **VentilFlex** in positive pressure (+) mode

The Diagram shows the leakage rates corrected for ambient temperature and pressure (f_{real}), and the compared leakage factors ($f_{max,A \div D}$) for the airtightness classes fixed in EN 12237 as a function of the tested pressures (p_{test}+) [6].

Table 3b: Measurement results for circular cross-section of the liner **VentilFlex** in negative pressure mode [6]

No.	p_{test}^{-} Pa	$\dot{V}_{test}$ $\frac{dm^3}{s}$	$\dot{V}_{corr}$ $\frac{dm^3}{s}$	f_{test} $\frac{dm^3}{m^2 s}$	f_{corr} $\frac{dm^3}{m^2 s}$	$f_{max,D}$ $\frac{dm^3}{m^2 s}$	$f_{max,C}$ $\frac{dm^3}{m^2 s}$	$f_{max,B}$ $\frac{dm^3}{m^2 s}$	$f_{max,A}$ $\frac{dm^3}{m^2 s}$
1	100	0.125	0.121	0.010	0.010	0.020	0.060	0.180	100
2	200	0.216	0.210	0.017	0.017	0.031	0.094	0.282	200
3	300	0.287	0.279	0.023	0.022	0.041	0.122	0.367	300
4	400	0.362	0.351	0.029	0.028	0.049	0.147	0.442	400
5	500	0.459	0.445	0.037	0.036	0.057	0.170	0.511	500
6	650	0.565	0.548	0.046	0.044	0.067	0.202	0.606	650
7	750	0.622	0.604	0.050	0.049	0.074	0.222	0.665	750
8	1000	0.781	0.758	0.063	0.061	0.089	0.267	0.802	1000

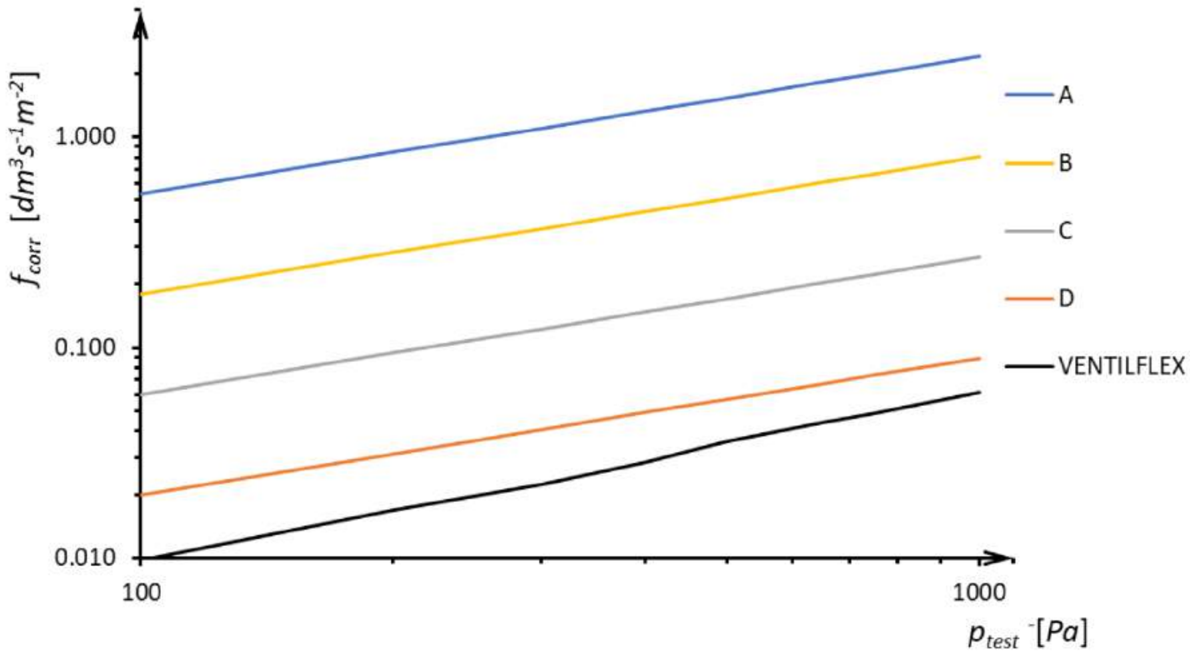

Figure 3b: Measurement results for circular liner **VentilFlex** in negative pressure (-) mode

The Diagram shows the leakage rates corrected for ambient temperature and pressure (f_{real}), and the compared leakage factors ($f_{max,A \div D}$) for the airtightness classes fixed in EN 12237 as a function of the tested pressures (p_{test}+) [6].

Table 3c: Measurement results for rectangular cross-section of the liner **VentilFlex** in positive pressure mode [6]

No.	p^{+}_{test} Pa	$\dot{V}_{test}$ $\frac{dm^3}{s}$	$\dot{V}_{corr}$ $\frac{dm^3}{s}$	f_{test} $\frac{dm^3}{m^2s}$	f_{corr} $\frac{dm^3}{m^2s}$	$f_{max,D}$ $\frac{dm^3}{m^2s}$	$f_{max,C}$ $\frac{dm^3}{m^2s}$	$f_{max,B}$ $\frac{dm^3}{m^2s}$	$f_{max,A}$ $\frac{dm^3}{m^2s}$
1	100	0.111	0.108	0.009	0.009	0.020	0.060	0.180	0.539
2	200	0.208	0.202	0.018	0.017	0.031	0.094	0.282	0.845
3	300	0.299	0.290	0.025	0.025	0.041	0.122	0.367	1.100
4	400	0.379	0.367	0.032	0.031	0.049	0.147	0.442	1.326
5	500	0.456	0.442	0.039	0.037	0.057	0.170	0.511	1.534
6	750	0.619	0.600	0.052	0.051	0.074	0.222	0.665	1.996
7	1000	0.780	0.756	0.066	0.064	0.089	0.267	0.802	2.406
8	1250	0.909	0.881	0.077	0.075	0.103	0.309	0.927	2.782
9	1500	1.043	1.010	0.088	0.086	0.116	0.348	1.044	3.132
10	1750	1.162	1.126	0.098	0.095	0.128	0.385	1.154	3.462
11	2000	1.310	1.269	0.111	0.108	0.140	0.420	1.259	3.776
12	2250	1.427	1.382	0.121	0.117	0.151	0.453	1.359	4.076

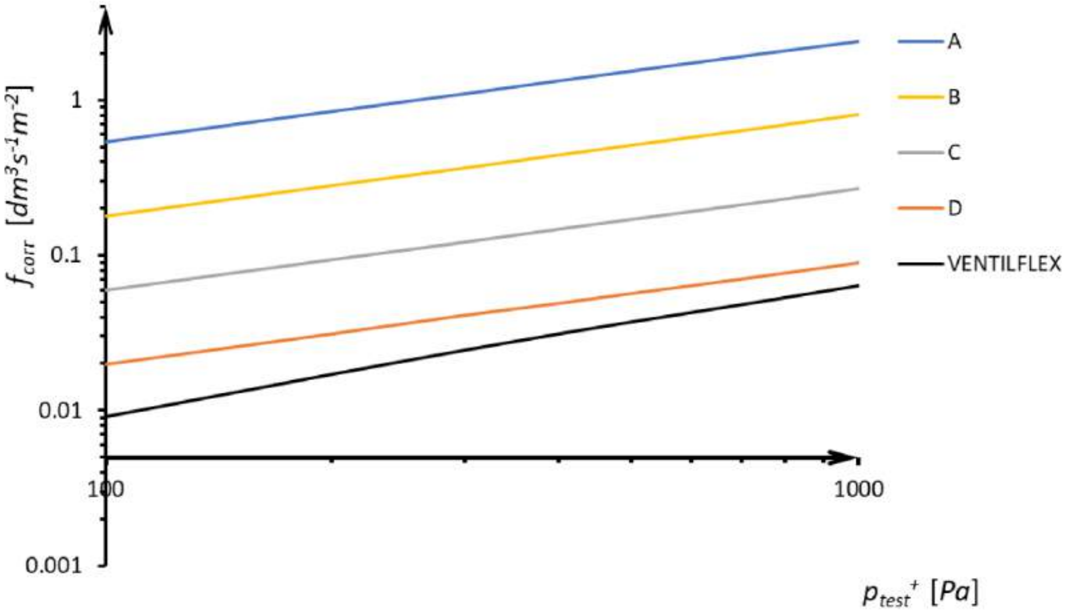

Figure 3c: Measurement results for rectangular liner **VentilFlex** in positive pressure (+) mode
The Diagram shows the leakage rates corrected for ambient temperature and pressure (f_{real}), and the compared leakage factors ($f_{max,A \div D}$) for the airtightness classes fixed in EN 1507 as a function of the tested pressures (p_{test}+) [6].

Table 3d: Measurement results for rectangular cross-section of the liner **VentilFlex** in negative pressure mode [6]

No.	p_{test}^{-} Pa	$\dot{V}_{test}$ $\frac{dm^3}{s}$	$\dot{V}_{corr}$ $\frac{dm^3}{s}$	f_{test} $\frac{dm^3}{m^2s}$	f_{corr} $\frac{dm^3}{m^2s}$	$f_{max,D}$ $\frac{dm^3}{m^2s}$	$f_{max,C}$ $\frac{dm^3}{m^2s}$	$f_{max,B}$ $\frac{dm^3}{m^2s}$	$f_{max,A}$ $\frac{dm^3}{m^2s}$
1	100	0.116	0.112	0.010	0.010	0.020	0.060	0.180	0.539
2	200	0.213	0.206	0.018	0.017	0.031	0.094	0.282	0.845
3	300	0.301	0.292	0.026	0.025	0.041	0.122	0.367	1.100
4	400	0.406	0.393	0.034	0.033	0.049	0.147	0.442	1.326
5	500	0.494	0.479	0.042	0.041	0.057	0.170	0.511	1.534
6	650	0.604	0.585	0.051	0.050	0.067	0.202	0.606	1.819
7	750	0.703	0.681	0.060	0.058	0.074	0.222	0.665	1.996
8	1000	0.93	0.901	0.079	0.076	0.089	0.267	0.802	2.406

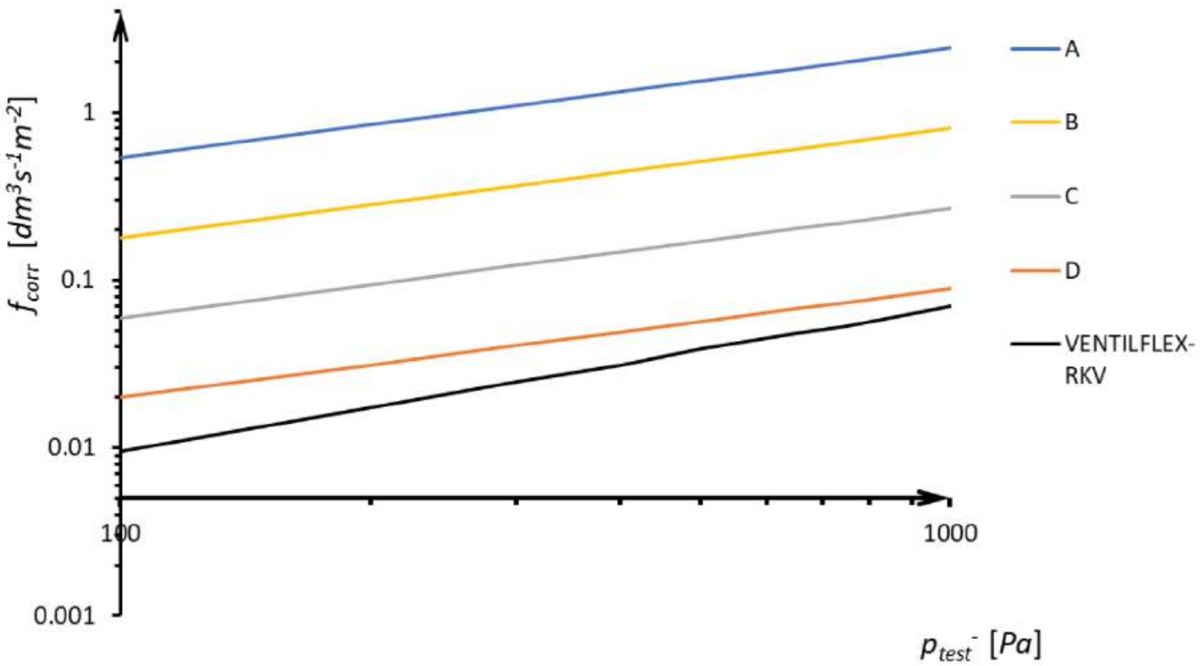

Figure 3d: Measurement results for rectangular liner **VentilFlex** in negative pressure (-) mode The Diagram shows the leakage rates corrected for ambient temperature and pressure (f_{real}), and the compared leakage factors ($f_{max,A\div D}$) for the airtightness classes fixed in EN 1507 as a function of the tested pressures (p_{test}+) [6].

Table 3e: Measurement results for circular cross-section of the liner **VentilFlex-RKV** in positive pressure mode [7]

No.	p^+_{test} Pa	$\dot{V}_{test}$ $\frac{dm^3}{s}$	$\dot{V}_{corr}$ $\frac{dm^3}{s}$	f_{test} $\frac{dm^3}{m^2s}$	f_{corr} $\frac{dm^3}{m^2s}$	$f_{max,D}$ $\frac{dm^3}{m^2s}$	$f_{max,C}$ $\frac{dm^3}{m^2s}$	$f_{max,B}$ $\frac{dm^3}{m^2s}$	$f_{max,A}$ $\frac{dm^3}{m^2s}$
1	100	0.238	0.232	0.019	0.019	0.020	0.060	0.180	0.539
2	200	0.388	0.378	0.031	0.031	0.031	0.094	0.282	0.845
3	300	0.544	0.530	0.044	0.043	0.041	0.122	0.367	1.100
4	400	0.680	0.663	0.055	0.054	0.049	0.147	0.442	1.326
5	500	0.843	0.822	0.068	0.067	0.057	0.170	0.511	1.534
6	700	1.124	1.095	0.091	0.089	0.071	0.212	0.636	1.908
7	900	1.404	1.368	0.114	0.111	0.083	0.250	0.749	2.247
8	1100	1.649	1.607	0.134	0.130	0.095	0.284	0.853	2.560
9	1300	1.907	1.859	0.154	0.150	0.106	0.317	0.951	2.854
10	1500	2.121	2.067	0.172	0.167	0.116	0.348	1.044	3.132
11	1700	2.328	2.269	0.188	0.184	0.126	0.377	1.132	3.397
12	1900	2.542	2.477	0.206	0.201	0.135	0.406	1.217	3.652
13	2000	2.592	2.526	0.210	0.205	0.140	0.420	1.259	3.776
14	2100	2.725	2.656	0.221	0.215	0.144	0.433	1.299	3.898

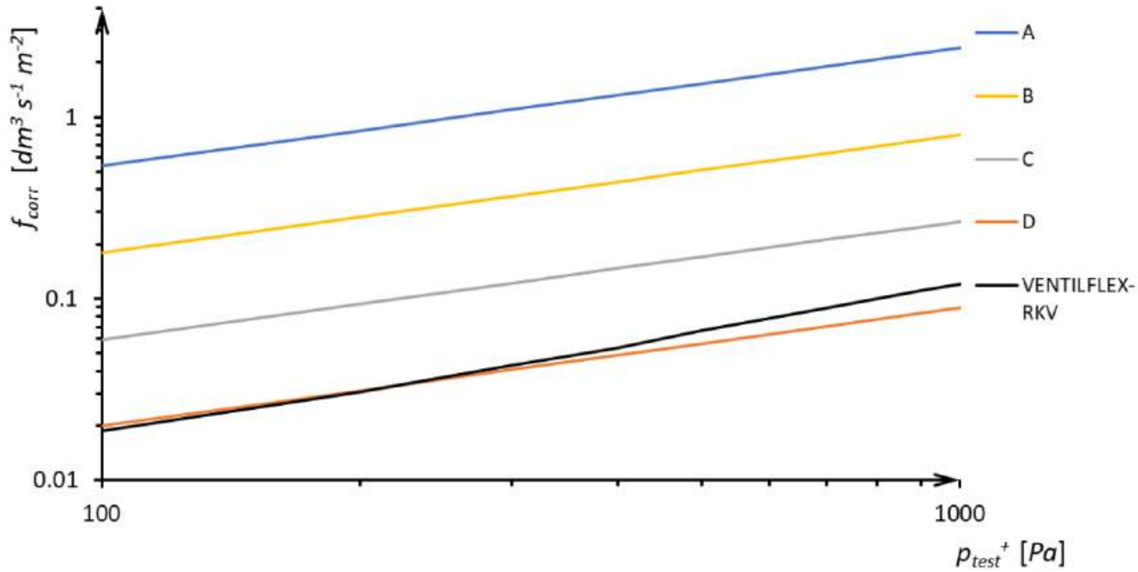

Figure 3e: Measurement results for circular liner **VentilFlex-RKV** in positive pressure (+) mode [7]

The Diagram shows the leakage rates corrected for ambient temperature and pressure (f_{real}), and the compared leakage factors ($f_{max,A \div D}$) for the airtightness classes fixed in EN 12237 as a function of the tested pressures (p_{test}+) [7].

Table 3f: Measurement results for circular cross-section of the liner **VentilFlex-RKV** in negative pressure mode [7]

No.	p_{test}^{-} Pa	$\dot{V}_{test}$ $\frac{dm^3}{s}$	$\dot{V}_{corr}$ $\frac{dm^3}{s}$	f_{test} $\frac{dm^3}{m^2s}$	f_{corr} $\frac{dm^3}{m^2s}$	$f_{max,D}$ $\frac{dm^3}{m^2s}$	$f_{max,C}$ $\frac{dm^3}{m^2s}$	$f_{max,B}$ $\frac{dm^3}{m^2s}$	$f_{max,A}$ $\frac{dm^3}{m^2s}$
1	100	0.217	0.212	0.018	0.017	0.020	0.060	0.180	0.539
2	200	0.376	0.366	0.030	0.030	0.031	0.094	0.282	0.845
3	300	0.534	0.520	0.043	0.042	0.041	0.122	0.367	1.100
4	400	0.671	0.654	0.054	0.053	0.049	0.147	0.442	1.326
5	500	0.828	0.807	0.067	0.065	0.057	0.170	0.511	1.534
6	650	1.005	0.979	0.081	0.079	0.067	0.202	0.606	1.819
7	800	1.218	1.187	0.099	0.096	0.077	0.231	0.694	2.081
8	950	1.410	1.374	0.114	0.111	0.086	0.259	0.776	2.327
9	1000	1.447	1.410	0.117	0.114	0.089	0.267	0.802	2.406
10	1100	1.578	1.538	0.128	0.125	0.095	0.284	0.853	2.560

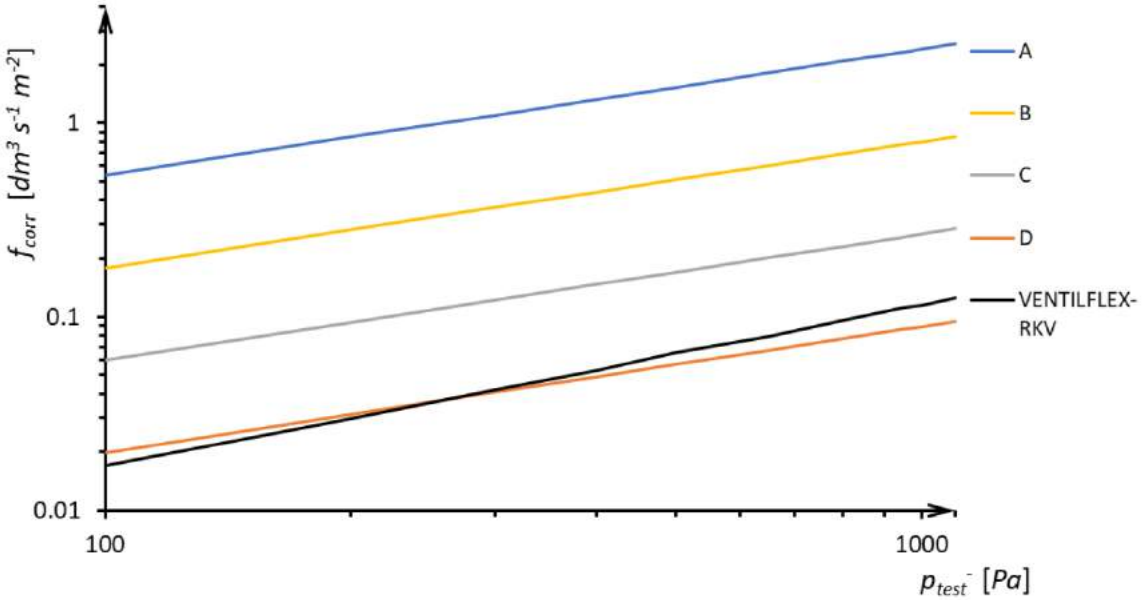

Figure 3f: Measurement results for circular liner **VentilFlex-RKV** in negative pressure (-) mode

The Diagram shows the leakage rates corrected for ambient temperature and pressure (f_{real}), and the compared leakage factors ($f_{max,A\div D}$) for the airtightness classes fixed in EN 12237 as a function of the tested pressures (p_{test}+) [7].

Table 3g: Measurement results for rectangular cross-section of the liner **VentilFlex-RKV** in positive pressure mode [7]

No.	p^+_{test} Pa	$\dot{V}_{test}$ $\frac{dm^3}{s}$	$\dot{V}_{corr}$ $\frac{dm^3}{s}$	f_{test} $\frac{dm^3}{m^2s}$	f_{corr} $\frac{dm^3}{m^2s}$	$f_{max,D}$ $\frac{dm^3}{m^2s}$	$f_{max,C}$ $\frac{dm^3}{m^2s}$	$f_{max,B}$ $\frac{dm^3}{m^2s}$	$f_{max,A}$ $\frac{dm^3}{m^2s}$
1	100	0.119	0.115	0.010	0.010	0.020	0.060	0.180	0.539
2	200	0.215	0.208	0.018	0.018	0.031	0.094	0.282	0.845
3	300	0.305	0.295	0.026	0.025	0.041	0.122	0.367	1.100
4	400	0.398	0.384	0.034	0.033	0.049	0.147	0.442	1.326
5	500	0.474	0.458	0.040	0.039	0.057	0.170	0.511	1.534
6	750	0.669	0.646	0.057	0.055	0.074	0.222	0.665	1.996
7	1000	0.859	0.830	0.073	0.070	0.089	0.267	0.802	2.406
8	1250	1.045	1.009	0.089	0.086	0.103	0.309	0.927	2.782
9	1500	1.258	1.215	0.107	0.103	0.116	0.348	1.044	3.132
10	1750	1.434	1.385	0.122	0.117	0.128	0.385	1.154	3.462
11	2000	1.607	1.552	0.136	0.132	0.140	0.420	1.259	3.776
12	2250	1.772	1.711	0.150	0.145	0.151	0.453	1.359	4.076

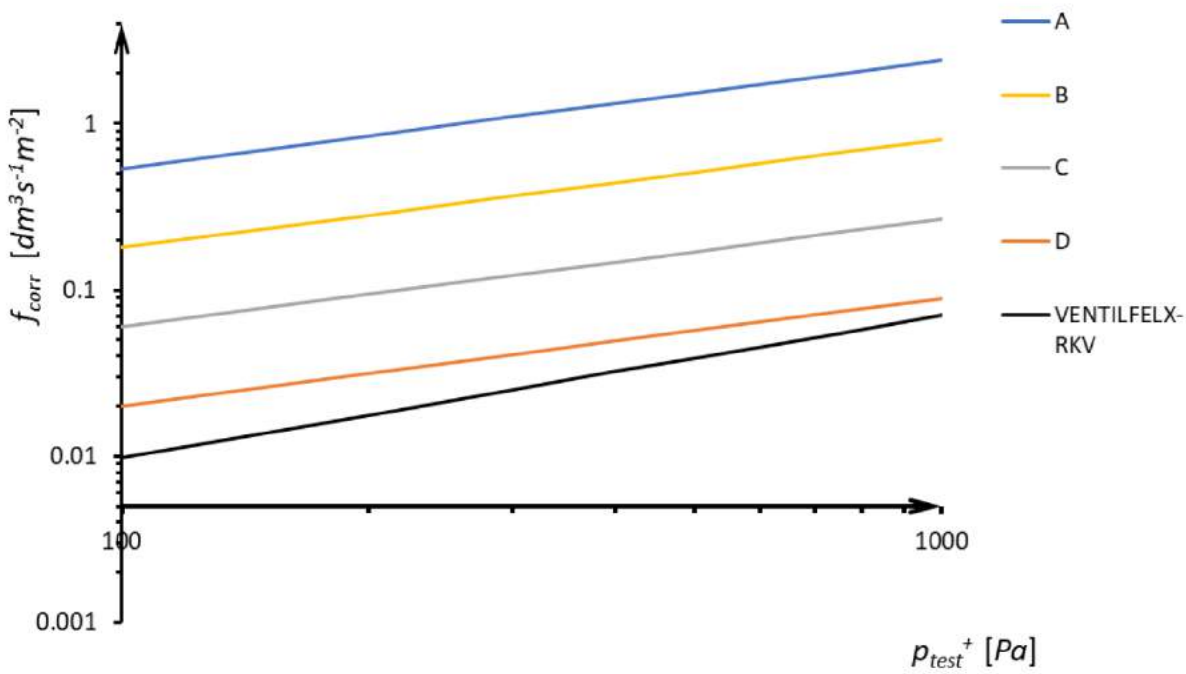

Figure 3g: Measurement results for rectangular liner **VentilFlex-RKV** in positive pressure (+) mode

The Diagram shows the leakage rates corrected for ambient temperature and pressure (f_{real}), and the compared leakage factors ($f_{max,A\div D}$) for the airtightness classes fixed in EN 1507 as a function of the tested pressures (p_{test}+) [7].

Table 3h: Measurement results for rectangular cross-section of the liner **VentilFlex-RKV** in negative pressure mode [7]

No.	p_{test}^{-} Pa	$\dot{V}_{test}$ $\frac{dm^3}{s}$	$\dot{V}_{corr}$ $\frac{dm^3}{s}$	f_{test} $\frac{dm^3}{m^2s}$	f_{corr} $\frac{dm^3}{m^2s}$	$f_{max,D}$ $\frac{dm^3}{m^2s}$	$f_{max,C}$ $\frac{dm^3}{m^2s}$	$f_{max,B}$ $\frac{dm^3}{m^2s}$	$f_{max,A}$ $\frac{dm^3}{m^2s}$
1	100	0.117	0.113	0.010	0.010	0.020	0.060	0.180	0.539
2	200	0.213	0.206	0.018	0.017	0.031	0.094	0.282	0.845
3	300	0.302	0.292	0.026	0.025	0.041	0.122	0.367	1.100
4	400	0.379	0.366	0.032	0.031	0.049	0.147	0.442	1.326
5	500	0.475	0.459	0.040	0.039	0.057	0.170	0.511	1.534
6	650	0.586	0.566	0.050	0.048	0.067	0.202	0.606	1.819
7	750	0.652	0.630	0.055	0.053	0.074	0.222	0.665	1.996
8	1000	0.853	0.824	0.072	0.070	0.089	0.267	0.802	2.406

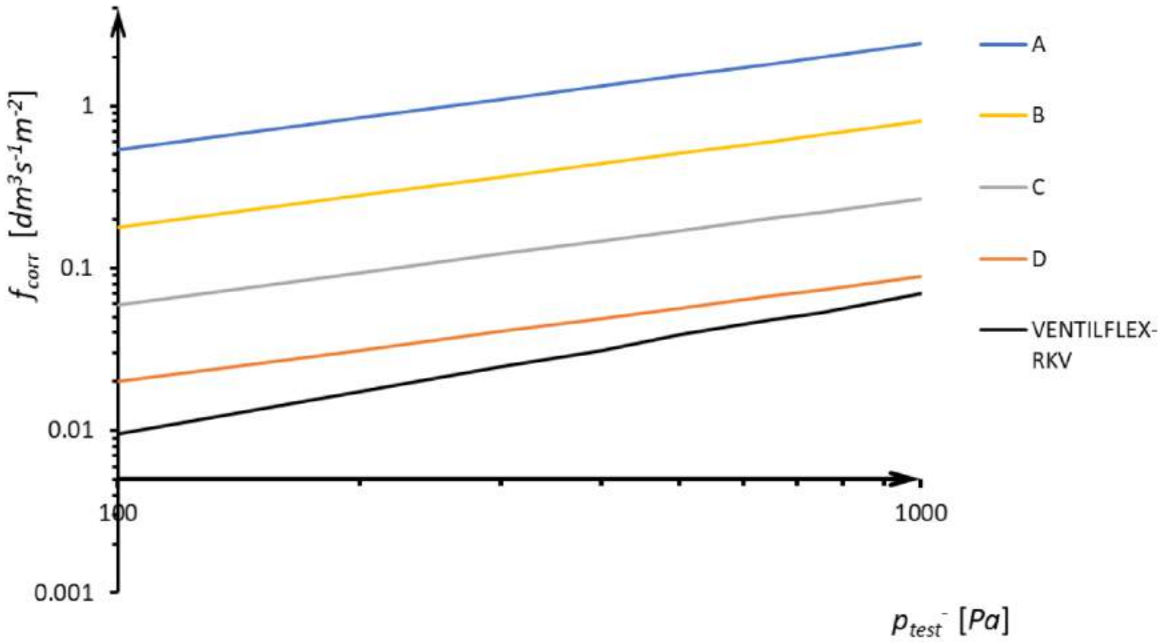

Figure 3h: Measurement results for rectangular liner **VentilFlex-RKV** in negative pressure (-) mode

The Diagram shows the leakage rates corrected for ambient temperature and pressure (f_{real}), and the compared leakage factors ($f_{max,A\div D}$) for the airtightness classes fixed in EN 1507 as a function of the tested pressures (p_{test}+) [7].

Conclusion

The assessed air leakage rates [$m^3\ s^{-1}m^{-2}$] are stated in Annex A 3 of the ETA [6.1; 7.1]. This requirement is met.

3.1.3 Flow resistance

Requirement

See EAD [1], Table 1 and Clause 2.2.3.

Assessment

Flow resistance of the liner **VentilFlex, VentilFlex-RKV** for vertical installation were assessed according to EN 13216-1 and are stated according to test report [8; 9].
In the assessment, the geometry of the liner **VentilFlex, VentilFlex-RKV** with circular and rectangular cross-section were considered.

For **VentilFlex** at vertical installation with circular cross section a mean roughness “r”, r = 0,0002 m and ζ-value = 0,43 is assessed [8].
For **VentilFlex** at vertical installation with rectangular cross section a mean roughness “r”, r = 0,0004 m and ζ-value = 0,59 is assessed [8].
These values are given in the ETA, Clause 3.1, Table 3.1.

For **VentilFlex-RKV** at vertical installation with circular cross section a mean roughness “r”, r = 0,0003 m and ζ-value = 0,87 is assessed [9].
For **VentilFlex-RKV** at vertical installation with rectangular cross section a mean roughness “r”, r = 0,0016 m and ζ-value = 0,86 is assessed [9].
These values are given in the ETA, Clause 3.1, Table 3.2.

For the inclined section and for the bow no performance has been assessed as no test reports were made available.

Conclusion

This requirement is met.

3.1.4 Microbiological growth

Requirement

See EAD [1], Table 1 and Clause 2.2.4.

Assessment and conclusion

No performance assessed.

3.1.5 Ring stiffness

Requirement

See EAD [1], Table 1 and Clause 2.2.5.

Assessment

This requirement applies only for liner with circular cross-section, see also EAD [1], Clause 2.2.5. In the case of circular cross-section the assessment of ring stiffness was tested according to EN 1228, Method A. The calculated ring stiffness mean value measured at three different points of a given specimen gave the relative initial ring stiffness S_o of the whole of the specimen. The values measured on the 80, 100, 150, 200 and 325 diameter specimen are given in test reports [11; 12].

Note: As the issue is mostly of relevance for the inclined sections of the liner, which is limited by diameters up to 325 mm (see Table in Clause 1 of the ETA), applying the NPA option for diameters > 325 mm for the vertical liner was considered by the manufacturer not as potential limitation in the use of that products.

Conclusion

The resulting ring stiffness of a whole line S_o is calculated and expressed in test reports [11; 12] and given Annex A 4 in the ETA.

The requirement is met.

3.1.6 Compound of the layered hardened liner

Requirement

See EAD [1], Table 1 and Clause 2.2.6.

Assessment

The compound of the layered hardened liner is defined by its resistance against delamination.

By means of the measurement and establishing a related tolerance, used for production, the assessed performance enables the continuous proof that the selected material has reached the conforming “B” state expressed in the reports [13, 14], which is foldable and appropriate for hardening. It also further ensures that the selected material has the appropriate interlayer hardness upon crosslinking. The establishing of related tolerances in relation to the achieved performance of the resistance against delamination is done in the control plan (see also Clause 5 in the ETA).

The average resulting tensile strength [MPa] according to test reports [13, 14] is stated in Clause 3.1, Table 2 and Table 3 respectively, in the ETA.

The composition of the layered hardened liner is defined by means of the raw materials, deposited with the technical documentation of the manufacturer. Declaration report [15].

Conclusion

The requirement is met.

3.1.7 Maximum height (including non-vertical installation)

Requirement

See EAD [1], Table 1 and Clause 2.2.7.

Assessment

The maximum height of the liner **VentilFlex, VentilFlex-RKV** are assessed for the self-supporting liner without opening sections according to EAD [1], Table 1 and Clause 2.2.7, for the diameters: 80 mm, 100 mm, 150 mm, 200 mm, 325 mm according to test reports [16, 17] and for diameter 800 mm according to test report [16.1]. Summarizing both test reports and related diameters covered by means of them, all conditions regarding the overall assessment for all related diameters are fulfilled. The related test results are given in test reports [16, 17].

Conclusion

- Total height of circular/ rectangular liner **VentilFlex** in case of straight installation to be stated in the ETA[1)]: 100 m

- Height of circular liner **VentilFlex** above the inclined section in case of non-vertical in: No performance assessed.

[1)] Limited by the production conditions (in comparison to theoretical value > 100 m according to test reports [16]

- Total height of circular/ rectangular liner **VentilFlex-RKV** in case of straight installation to be stated in the ETA[1)]: 100 m

- Height of circular liner **VentilFlex-RKV** above the inclined section in case of non-vertical installation: No performance assessed.

[1)] Limited by the production conditions (in comparison to theoretical value > 100 m according to test reports [17]

The results are stated in the ETA, Clause 3.1, Table 2 and Table 3.

3.2 Overall conclusion

Assessment has been conducted and assessed in accordance with the EAD [1] in consideration of the aspects stated in this Evaluation Report. The assessment shows that **VentilFlex, VentilFlex-RKV** meet all relevant requirements for the intended use.

4 Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

See ETA, Clause 4.

Regarding the applicable AVCP System 1-3-4 with regard to reaction to fire Decision (2015/1936/EC (EU)), the relevance of System 3 is stated in classification reports [3, 4] for both products.

Documentation

Documents available to the body responsible for the evaluation of constancy of performance (AVCP) include:

- The ETA
- Basic manufacturing process [18,19]
- Product and materials specifications
- Control plan

5 Reference documents

[1] EAD 360032-00-0803 Liner, made of glass fibres, mineral and organic substances, used for relining of ducts for ventilation purposes; Edition February 2020

[2a] Test report: Change of cross-section of VentilFlex and VentilFlex-RKV liners in 45°inclination; Kompozitor Kft., Hungary 2220 Vecsés, Széchenyi u. 60, 5th October 2020.

[2b] Declaration of the manufacturer on product identity of VentilFlex and Furanflex, Kompozitor Müanyagipari Fejlesztö Kft, Széchenyi utca Hungary 60; H-2220 Vecsés.

[2d] Declaration of the manufacturer on product identity of VentilFlex-RKV and Furanflex-RWV, Kompozitor Müanyagipari Fejlesztö Kft, Széchenyi utca Hungary 60; H-2220 Vecsés, dated 13.10.2020

[2e] ABRASION RESISTANCE OF VENTILFLEX® FLEXIBLE COMPOSITE VENTILATION LINER; Kompozitor Kft., Hungary 2220 Vecsés, Széchenyi u. 60, 5th November 2020

[2f] ABRASION RESISTANCE OF VENTILFLEX RKV® FLEXIBLE COMPOSITE VENTILATION LINER; Kompozitor Kft., Hungary 2220 Vecsés, Széchenyi u. 60, 5th November 2020

[2g] Cleaning instructions of VentilFlex and VentilFlex-RKV by the manufacturer, Kompozitor Müanyagipari Fejlesztö Kft, Széchenyi utca Hungary 60; H-2220 Vecsés, dated 13.10.2020

[3] CLASSIFICATION REPORT acc. EN 13501-1:2019 for VentilFlex, EMI Nonprofit Kft. Fire Testing laboratory, 2000 Szentendre, Dozsa György ut 26; Dated, 06. November 2020

[4] CLASSIFICATION REPORT acc. EN 13501-1:2019 for VentilFlex-RKV, EMI Nonprofit Kft. Fire Testing laboratory, 2000 Szentendre, Dozsa György ut 26; Dated, 2020.10.12.

[4.1] Standard MSZ EN 13501-1, in ungarischer Sprache ident mit EN 13501-1:2018

[5] Commission Delegated Regulation (EU) 2016/364 of 1 July 2015 on the classification of the reaction to fire performance of construction products pursuant to Regulation (EU) No 305/2011 of the European Parliament and of the Council.

[6] Expert report: Determination of leakage characteristics of VENTILFLEX ductworks, 27 May 2020; Budapest University of Technology and Economics Department of Building and Services and Process Engineering

[6.1] Table VentilFlex – Air tightness results (see ETA Annex 4)

[7] Expert report: Determination of leakage characteristics of VENTILFLEX-RKV ductworks, 27 May 2020; Budapest University of Technology and Economics Department of Building and Services and Process Engineering

[7.1] Table VentilFlex RKV – Air tightness results (see ETA Annex 4)

[8] Expert report: Determination of the inner mean surface roughness of VENTILFLEX ventilation liner pipe, 27 May 2020; Budapest University of Technology and Economics Department of Building and Services and Process Engineering

[9] Expert report: Determination of the inner mean surface roughness of VENTILFLEX-RKV ventilation liner pipe, 27 May 2020; Budapest University of Technology and Economics Department of Building and Services and Process Engineering

[11] RING STIFFNESS TEST of VENTILFLEX liner tubes with various diameters; Kompozitor Kft., Vecsés 5th October 2020

[12] RING STIFFNESS TEST of VENTILFLEX RKV liner tubes with various diameters; Kompozitor Kft., Vecsés 5th October 2020

[13] Interlayer adhesion inspection of VENTILFLEX pre-preg raw materials (Minutes of Inspection); Kompozitor Kft., Vecsés, 30th September 2019

[14] Interlayer adhesion inspection of VENTILFLEX-RKV pre-preg raw materials (Minutes of Inspection); Kompozitor Kft., Vecsés, 25th October 2019

[15] List of Ingredients by Kompozitor Kft.

[16] Determination of maximum height of VENTILFLEX flexible composite ventilation liner (test report); Kompozitor Kft., Hungary 2220 Vecsés, Széchenyi u. 60, dated 22.06.2020

[17] Determination of maximum height of VENTILFLEX-RKV flexible composite ventilation liner (test report); Kompozitor Kft. Hungary 2220 Vecsés, Széchenyi u. 60, dated 22.06.2020

[18] Basic manufacturing process of VENTILFLEX flexible composite ventilation liner; Kompozitor Kft., Hungary 2220 Vecsés, Széchenyi u. 60, dated 04.03.2021

[19] Basic manufacturing process of VENTILFLEX-RKV flexible composite ventilation liner; Kompozitor Kft., Hungary 2220 Vecsés, Széchenyi u. 60, dated 04.03.2021

EAD 360001-00-0803, Ventilation system made of mineral wool covered with film on outside and inside; Edition October 2016

EN 1228:1996 “Plastics piping systems - Glass-reinforced thermosetting plastics (GRP) pipes - Determination of initial specific ring stiffness“

EN 1507:2006 “Ventilation for buildings – Sheet metal air ducts with rectangular section – Requirements for strength and leakage”

EN 12237:2003 “Ventilation for buildings – Ductwork – Strength and leakage of circular sheet metal ducts”

EN 13216-1:2019 “Chimneys - Test methods for system chimneys - Part 1: General test methods”

EN 14239:2004 “Ventilation for buildings – Ductwork – Measurement of ductwork surface area”