Test Report

No. 106 34533en

Date of report	16. November 2012
Client	FF Systembau GmbH Hauptstraße 35 94439 Münchsdorf/Roßbach Germany
Order	Air permeability test
Object	Aluminium access panel System F2 - AKL clad with 12.5 mm and 25 mm gypsum plasterboard (GKBI)

Contents

This is a translation of test report 106 34533 dated 08 November 2007

1 Order

The company FF Systembau GmbH, 94424 Arnstorf (Germany), commissioned the **ift** Rosenheim, to test the air permeability of the test specimens described below:

2 Object

2.1 Description of test specimen

Product name/system	Aluminium access panel System F2 - AKL, installed in gypsum plasterboard ceilings (GKBI 12.5 mm / 25 mm).
External frame	Aluminium angle profile 30 x 27.5 x 2 mm, corners mitred and welded, mounted to gypsum plasterboard ceiling and screw-fitted continuously around perimeter (Teks 3,5 x 35 mm).
Overall dimensions	1,060 mm x 1,060 mm
Access panel	*Test specimen 1:* Frame: aluminium angle profile 30 x 27,5 x 2 mm, corners mitred and welded; plasterboard inlay bonded to frame (GKBI 25 mm) *Test specimen 2:* Frame: aluminium angle profile 30 x 15 x 2 mm, corners mitred and welded; plasterboard inlay bonded to frame (GKBI 12.5 mm) Reinforcement of panel using three rectangular aluminium tubes 30 x 30 x 2 mm each on sides and at centre of frame clear opening, screw-fitted to gypsum plasterboard inlay using Teks 3.5 x 25 mm.
Overall dimensions	996 mm x 996 mm, this gives a joint continuous around perimeter of 2 mm width to external frame.
Rebate seal	Brush seal with central web (film), company: Schlegel, 4 .8 x 3.0 mm (width x height), bonded to aluminium frame of panel, continuous around corners
Hardware	On sides - 1 aluminium pivot hinge each in aluminium angle 20 x 20 x 2 mm, length: 50 mm, compressed and welded to aluminium frame of panel welded to external frame - aluminium angle with 20 x 20 x 2 mm engagement hook, length: 50 mm Test specimen 2 features an additional hinge-side security device at the centre, composed of a conical pin, screw-fitted to the frame of the panel via an aluminium angle and via an aluminium angle with oblong hole which is screw-fitted to the external frame.

	On lock side - three spring-loaded catches with locking device. Spring-loaded catches screw-fitted to weld-jointed aluminium angle 40 x 20 x 2 mm using 2 drilling screws each 2.9 x 19 mm. Locking devices screw-fitted to aluminium frame of panel using 1 drilling screw 3.5 x 9.5 mm each. On left and right-hand sides, one catchwire each with snap hook.
Locking devices	Test specimen 2 was tested with the below locks: *Variation 1:* Surface-mounted latch lock: The lock case is bonded to the panel and screw-fitted. *Variation 2:* Cylinder cam lock: The lock is passed through and screw-fitted using a nut. *Variation 3:* Pin fasteners: The base plate is bonded to the panel and screw-fitted.

The description is based on inspection of the test specimen at the **ift**. Item designations/numbers as well as material specifications were given by the client. The design details were examined solely on the basis of the characteristics to be classified.

2.2 Representation of test specimen

The photographs were taken at the **ift** during testing. The drawings are based on unchanged documentation provided by the client.

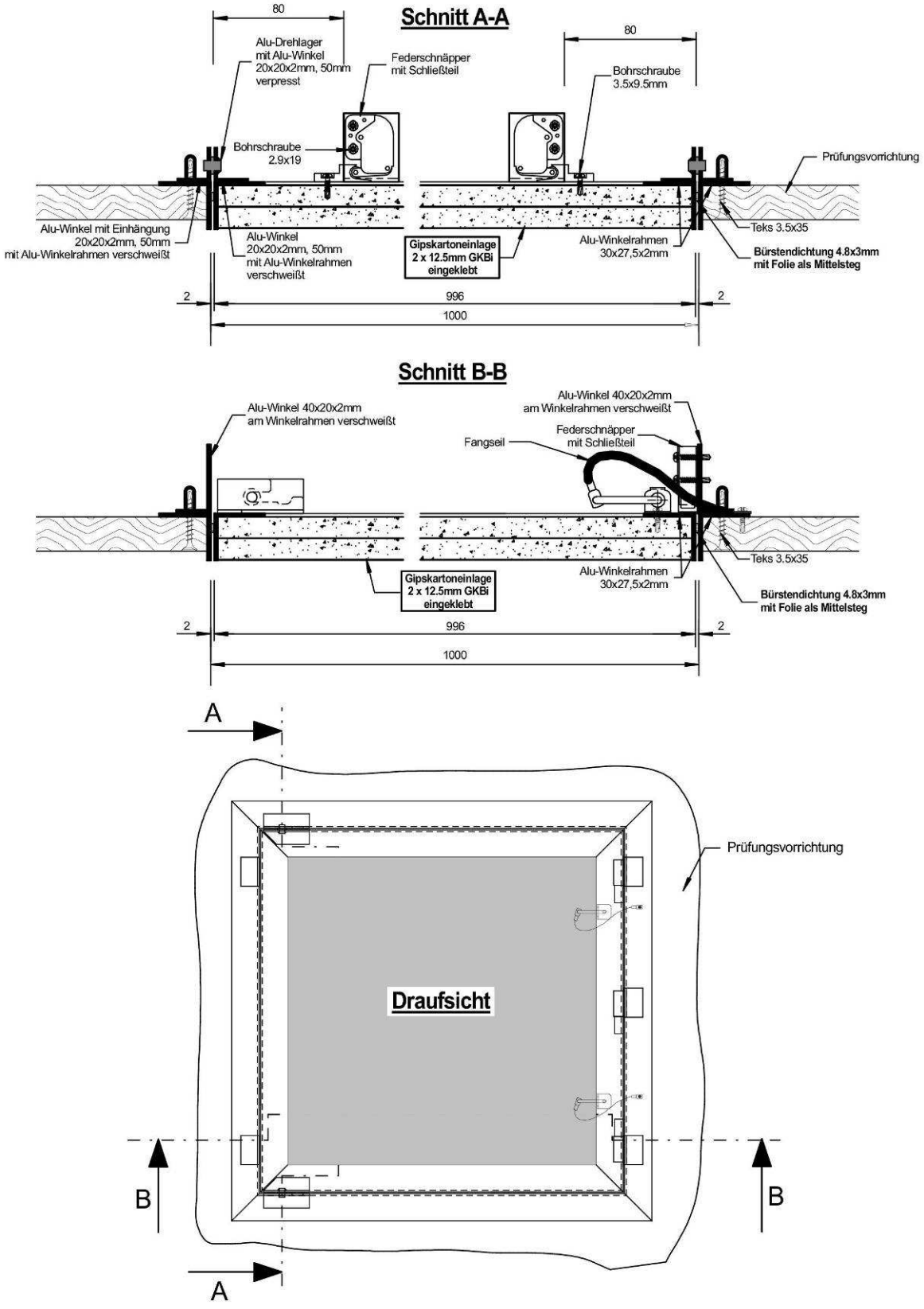


Fig. 1 Drawing - referring to test specimen 1 (panel with 25 mm GKBI)

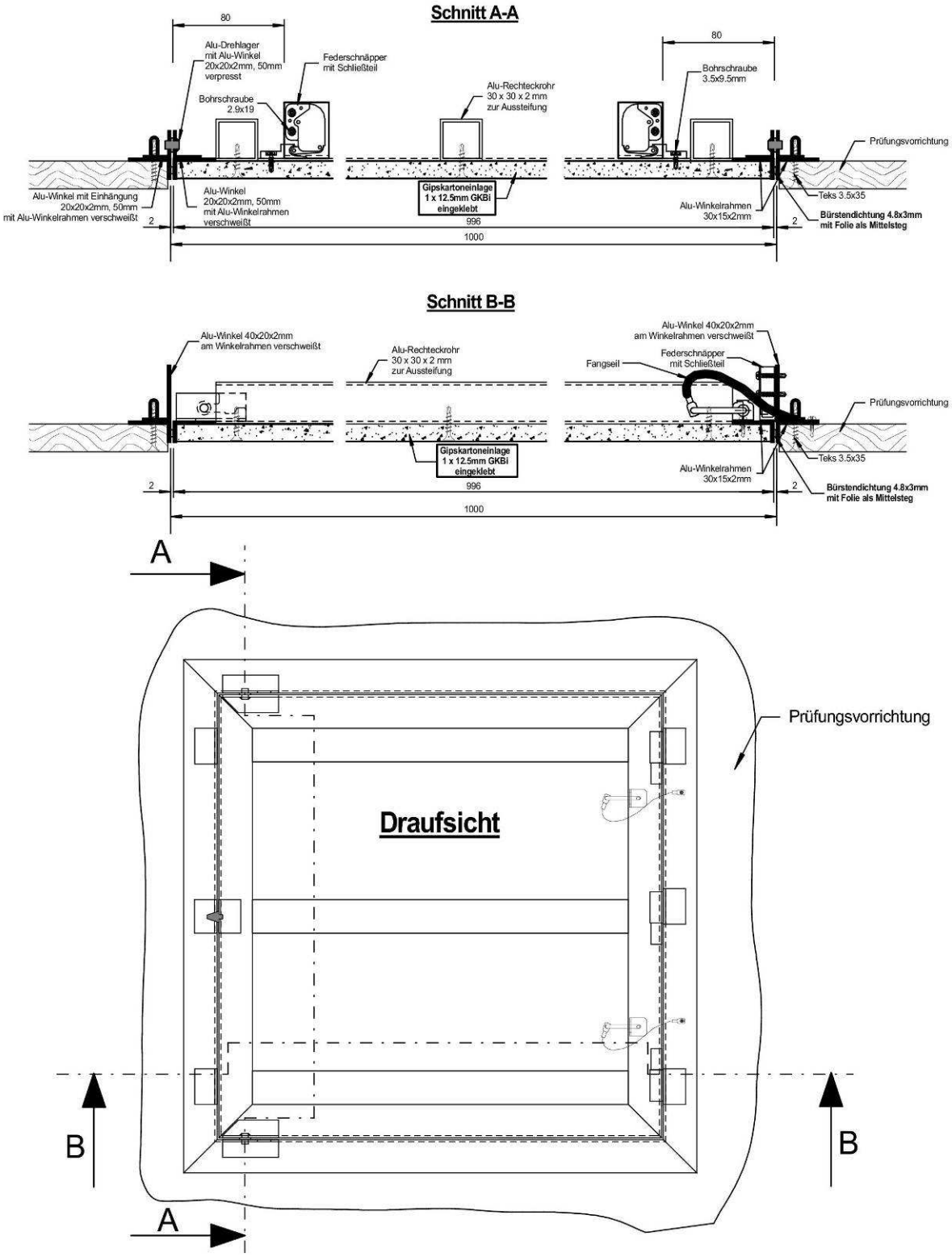


Fig. 2 Drawing - referring to test specimen 2 (panel with 12.5 mm GKBI and aluminium reinforcements)

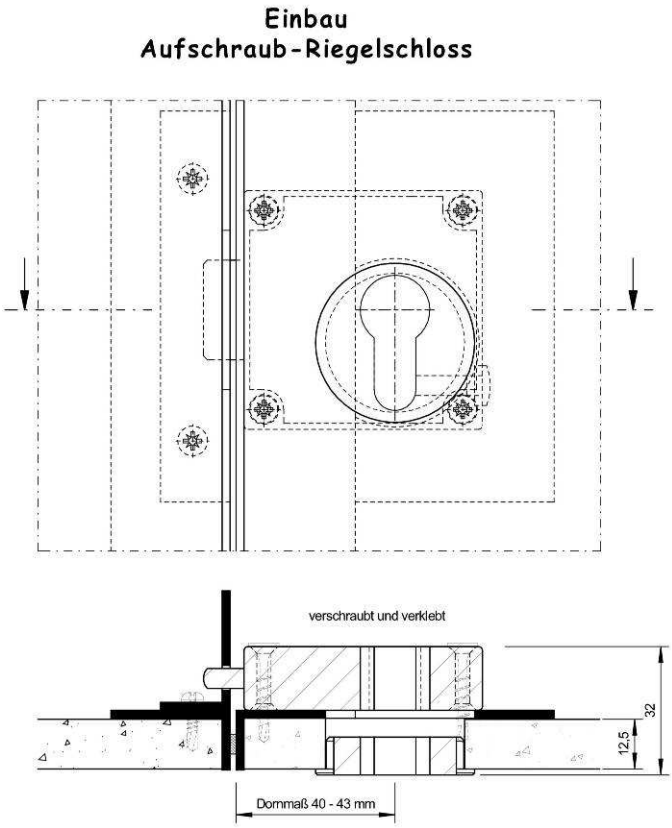


Fig. 3 Drawing - surface mounted latch-bolt lock in panel with 12.5 mm GKBI

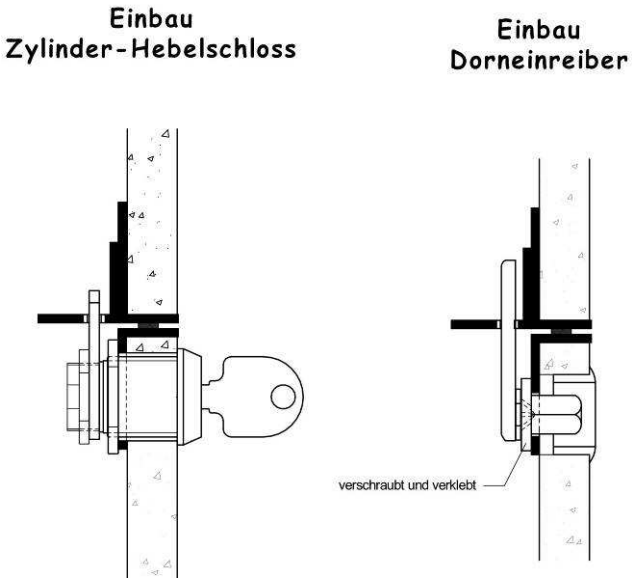


Fig. 4 Drawing - surface-mounted cylinder cam lock and pin-fastener in panel with 12.5 mm GKBI

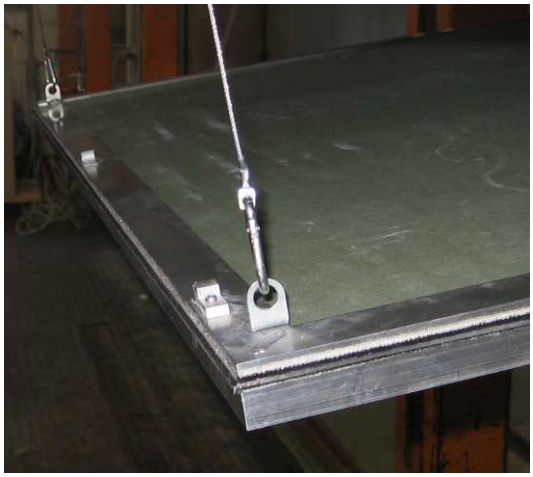


Fig. 5 Panel with aluminium frame and continuous brush seal

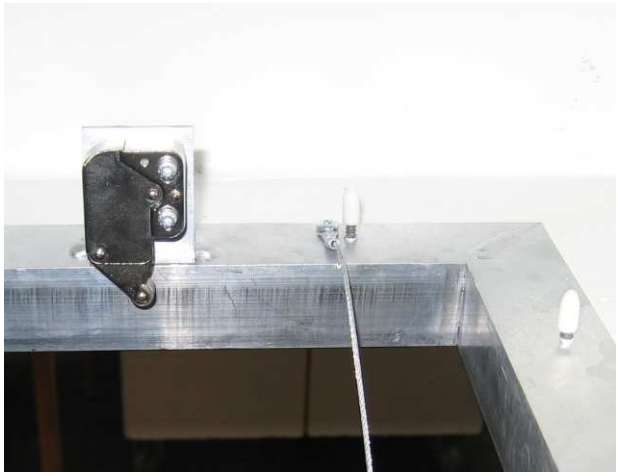


Fig. 6 External frame with snap lock

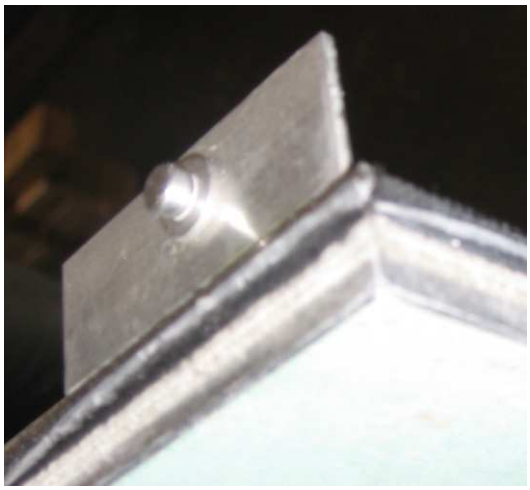


Fig. 7 Aluminium pivot hinge

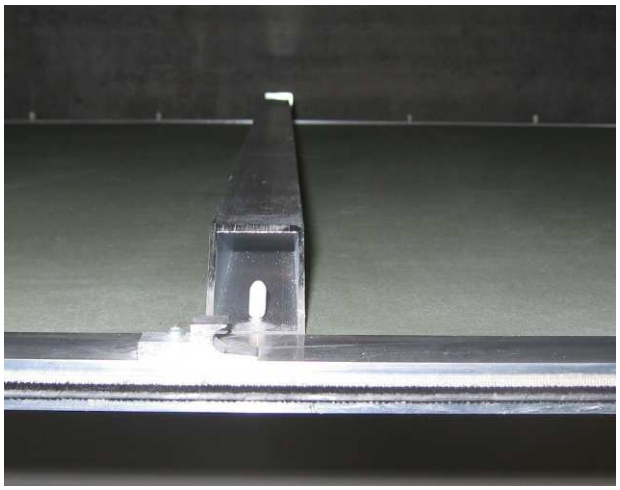
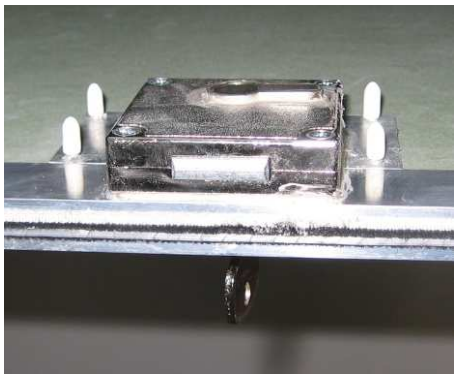


Fig. 8 Aluminium reinforcement for 12.5 mm GKBI panel



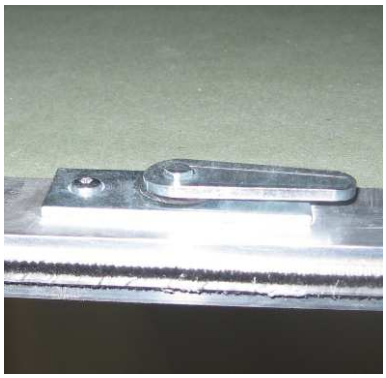


Fig. 9, 10, 11 Lock variations fitted to test specimen 2

2.3 Test set-up

Air permeability for installation in ceilings was tested on the test specimen in the usual built position (horizontal). For being able to use the window test rig for testing, client supplied a test apparatus.

Above a baseplate fixed to the test rig, the "test chamber" was connected airtight above the access panel. The test specimen was mounted to the bottom.

At first a zero measurement was conducted (positive and negative pressures) to determine the residual air flow rate of the test rig. All joints of the test specimen were sealed with adhesive tape.

Fig. 12, 13 Test set-up and installation of access panels

3 Procedure

3.1 Sampling

The samples were selected by the client.

Number	2
Delivered on	16 October 2007 by the client
Registration number	22690 /001 /002

3.2 Method/s

The test was based on the following standards:

EN 1026 : 2000-09	Windows and doors - Air permeability - Test method

Comparative evaluation of the test results was based on the following standard:

EN 12207 : 1999-11	Windows and doors - Air permeability - Classification.

Boundary conditions	as specified by the standard
Deviation	There have been no deviations from the test method/s and/or test conditions

3.3 Test apparatus

Window test rig	Device No.: 22200

3.4 Testing

Date/Period	16/17 October 2007
Testing personnel	Wolfgang Jehl, Dipl.-Ing. (FH)

3.5 Test sequence

The test sequence was as follows.

Table 1 Test sequence

No.	Test	Test standard
1.	Air permeability - test specimen 1	EN 1026
2.	Air permeability - test specimen 1 masked (zero measurement)	
3.	Air permeability - test specimen 2	
4.	Air permeability - test specimen 2 masked (zero measurement)	
5.	Air permeability of test specimen 2 (masked), lock variation 1	
6.	Air permeability of test specimen 2 (masked), lock variation 2	
7.	Air permeability of test specimen 2 (masked), lock variation 3	

4 Results

4.1 Results of test specimen 1 – aluminium access panel System F2 – AKL with 25 mm GKBI - without lock

Joint length: 3.98 m
Overall area of test specimen: 1.12 m²

Table 2 Measured values for positive pressure on upper surface

Pressure difference in Pa / Flow rate (volume)		50	100	150	200	250	300	450	600
Absolute	**m³/h *)**	0.0	0.3	0.4	0.5	0.5	0.5	0.7	1.0
Joint length related	**m³/hm**	0.00	0.08	0.10	0.13	0.13	0.13	0.18	0.25
Area related	**m³/hm²**	0.00	0.27	0.36	0.44	0.44	0.44	0.62	0.89

Table 3 Measured values for negative pressure on upper surface

Pressure difference in Pa / Flow rate (volume)		50	100	150	200	250	300	450	600
Absolute	**m³/h *)**	0.1	0.1	0.3	0.3	0.4	0.4	0.8	1.8
Joint length related	**m³/hm**	0.03	0.03	0.08	0.08	0.10	0.10	0.20	0.45
Area related	**m³/hm²**	0.09	0.09	0.27	0.27	0.36	0.36	0.71	1.60

*) Measuring accuracy: 0.1 m³/h

The joint-length related permeability and the area-related air permeability for positive pressure (red) and negative pressure (blue) are plotted in diagrams 1 and 2.

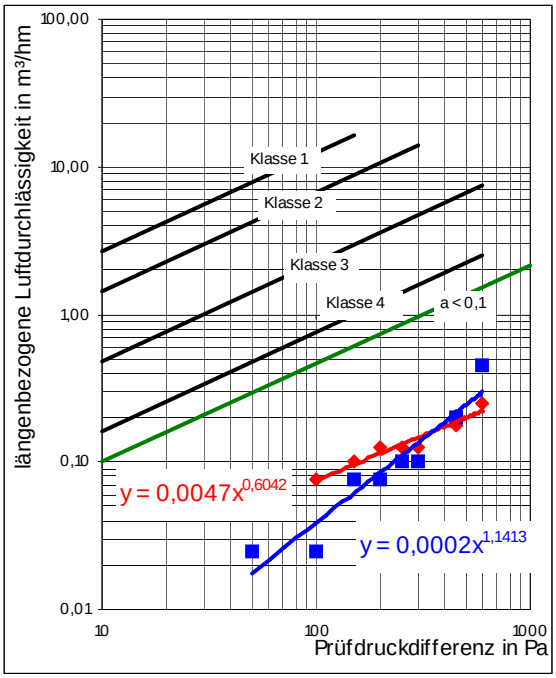


Diagram 1 Joint-length related
air permeability
red = positive pressure
blue = negative pressure

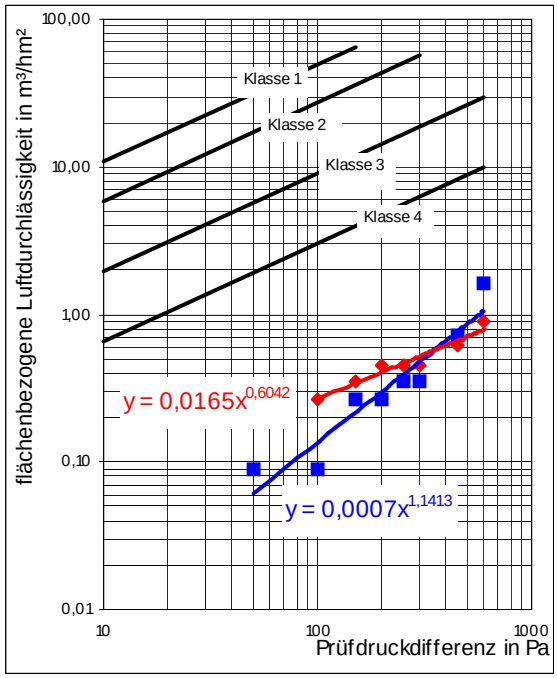


Diagram 2 Area-related
air permeability
red = positive pressure
blue = negative pressure

Table 4 Reference permeability based on EN 12207

Reference air permeability	Positive pressure	Negative pressure
Related to joint length	**Q_{100} = 0.08 m^3/hm**	**Q_{100} = 0.04 m^3/hm**
Related to overall area	**Q_{100} = 0.27 m^3/hm**	**Q_{100} = 0.13 m^3/hm^2**

Based on EN 12207 Windows and Doors, air permeability, classification, the aluminium access panel System F2 - AKL with 25 mm GKBI qualifies for negative and positive pressure for

Class 4

As regards joint-related air permeability, the requirements for air permeability of linear joint seals as per DIN 4108-2 are fulfilled with

$$a < 0.1\ m^3/[h\ m\ (daPa)^{2/3}]$$

(green limit curve, diagram 1).

4.2 Results of test specimen 2 – aluminium access panel System F2 – AKL with 12.5 mm GKBI - without lock

Joint length: 3.98 m
Overall area of test specimen: 1.12 m²

Table 5 Measured values for positive pressure on upper surface

Pressure difference in Pa / Flow rate (volume)		50	100	150	200	250	300	450	600
Absolute	**m³/h *)**	0.0	0.2	0.3	0.3	0.3	0.3	0.5	0.9
Joint length related	**m³/hm**	0.00	0.05	0.08	0.08	0.08	0.08	0.13	0.23
Area related	**m³/hm²**	0.00	0.18	0.27	0.27	0.27	0.27	0.44	0.80

Table 6 Measured values for negative pressure on upper surface

Pressure difference in Pa / Flow rate (volume)		50	100	150	200	250	300	450	600
Absolute	**m³/h *)**	0.0	0.1	0.3	0.3	0.3	0.4	0.4	0.5
Joint length related	**m³/hm**	0.00	0.03	0.08	0.08	0.08	0.10	0.10	0.13
Area related	**m³/hm²**	0.00	0.09	0.27	0.27	0.27	0.36	0.36	0.44

*) Measuring accuracy: 0.1 m³/h.

The joint-length related permeability and the area-related air permeability for positive pressure (red) and negative pressure (blue) are plotted in diagrams 3 and 4.

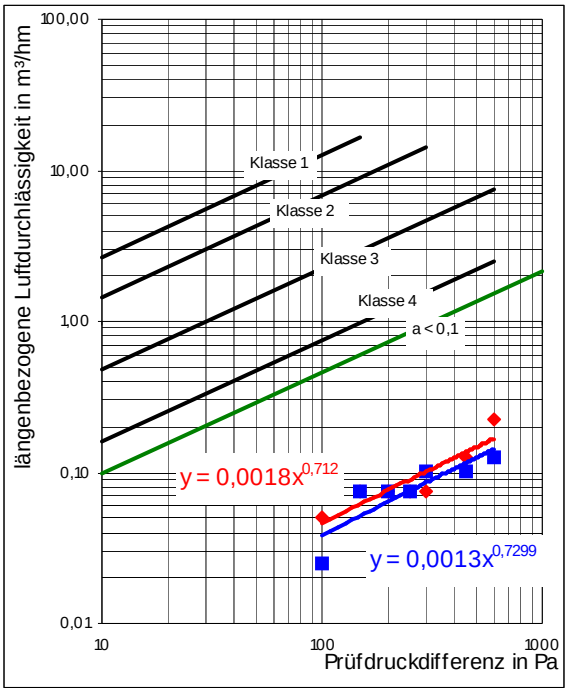


Diagram 3 Joint-length related
air permeability
red = positive pressure
blue = negative pressure

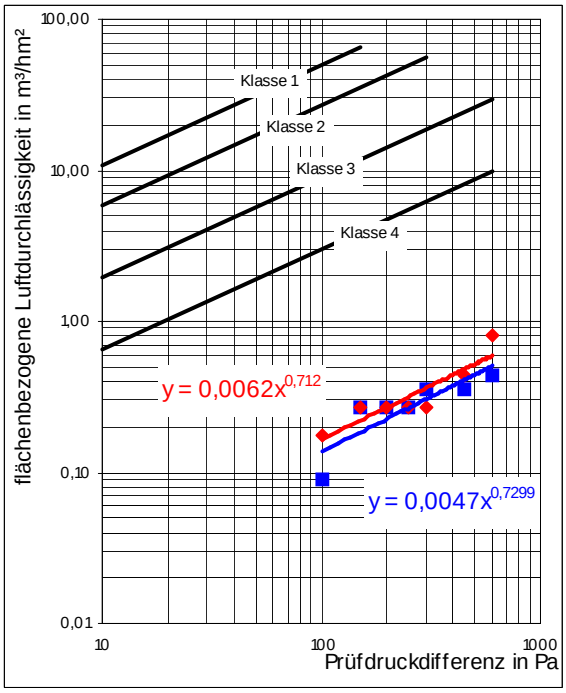


Diagram 4 Area-related
air permeability
red = positive pressure
blue = negative pressure

Table 7 Reference permeability based on EN 12207

Reference air permeability	Positive pressure	Negative pressure
related to joint length	**Q_{100} = 0.05 m³/hm**	**Q_{100} = 0.04 m³/hm**
related to overall area	**Q_{100} = 0.16 m³/hm**	**Q_{100} = 0.14 m³/hm²**

Based on EN 12207 Windows and Doors, air permeability, classification, the aluminium access panel System F2 - AKL with 12.5 mm GKBI qualifies for negative and positive pressure for

Class 4

As regards joint-related air permeability, the requirements for air permeability of linear joint seals as per DIN 4108-2 are fulfilled with

$$a < 0.1\ m^3/[h\ m\ (daPa)^{2/3}]$$

(green limit curve, diagram 3).

4.3 Results of test specimen 2 – aluminium access panel System F2 – AKL with 12.5 mm GKBI - with surface-mounted latchbolt lock

4.3.1 Air permeability - surface-mounted latchbolt lock

Table 8 Measured values for positive pressure on upper surface

Pressure difference in Pa / Flow rate (volume)		50	100	150	200	250	300	450	600
Absolute	**m³/h *)**	0.3	0.5	0.6	0.6	0.7	0.8	1.2	1.4

Table 9 Measured values for negative pressure on upper surface

Pressure difference in Pa / Flow rate (volume)		50	100	150	200	250	300	450	600
Absolute	**m³/h *)**	0.2	0.4	0.5	0.5	0.5	0.6	0.6	0.8

*) Measuring accuracy: 0.1 m³/h

4.3.2 Air permeability - aluminium access panel System F2 – AKL with surface-mounted latchbolt lock

Joint length: 3.98 m
Overall area of test specimen: 1.12 m²

Table 10 Measured values for positive pressure on upper surface

Pressure difference in Pa / Flow rate (volume)		50	100	150	200	250	300	450	600
absolute	**m³/h *)**	0.3	0.7	0.9	0.9	1.0	1.1	1.7	2.3
joint length related	**m³/hm**	0.08	0.18	0.23	0.23	0.25	0.28	0.43	0.58
area related	**m³/hm²**	0.27	0.62	0.80	0.80	0.89	0.98	1.51	2.05

Table 11 Measured values for negative pressure on upper surface

Pressure difference in Pa / Flow rate (volume)		50	100	150	200	250	300	450	600
Absolute	**m³/h *)**	0.2	0.5	0.8	0.8	0.8	1.0	1.0	1.3
Joint length related	**m³/hm**	0.05	0.13	0.20	0.20	0.20	0.25	0.25	0.33
Area related	**m³/hm²**	0.18	0.44	0.71	0.71	0.71	0.89	0.89	1.16

*) Measuring accuracy is 0,1 m³/h. Added values from tables 5 or 6 and Table 8 or 9.

The joint-length related permeability and the area-related air permeability for positive pressure (red) and negative pressure (blue) are plotted in diagrams 5 and 6.

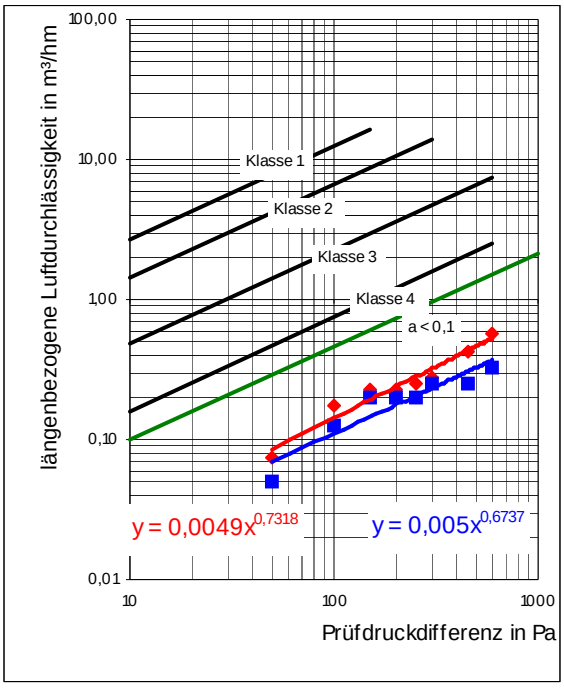


Diagram 5 Joint-length related
air permeability
red = positive pressure
blue = negative pressure

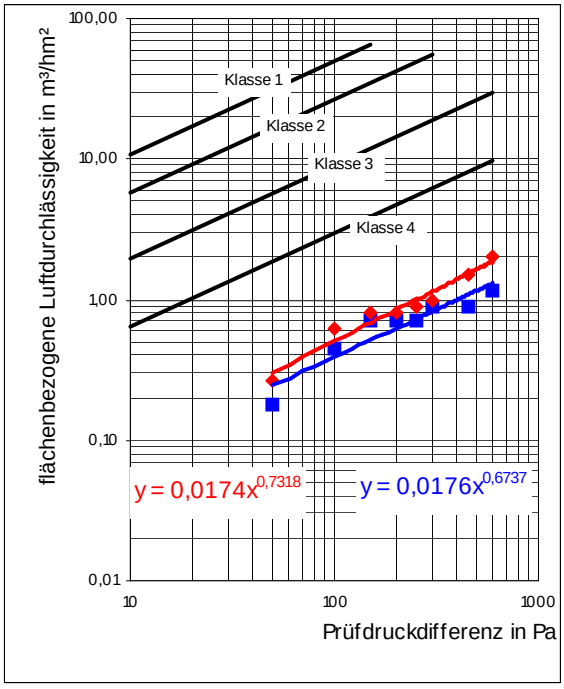


Diagram 6 Area-related
air permeability
red = positive pressure
blue = negative pressure

Table 12 Reference permeability based on EN 12207

Reference air permeability	Positive pressure	Negative pressure
Related to joint length	**Q_{100} = 0.14 m^3/hm**	**Q_{100} = 0.11 m^3/hm**
Related to overall area	**Q_{100} = 0.51 m^3/hm**	**Q_{100} = 0.39 m^3/hm^2**

Based on EN 12207 Windows and Doors, air permeability, classification, the aluminium access panel System F2 - AKL with 12.5 mm GKBI qualifies for negative and positive pressure for

Class 4

As regards joint-related air permeability, the requirements for air permeability of linear joint seals as per DIN 4108-2 are fulfilled with

$$\mathbf{a < 0.1\ m^3/[h\ m\ (daPa)^{2/3}]}$$

(green limit curve, diagram 5).

4.4 Results of test specimen 2 – aluminium access panel System F2 – AKL with 12.5 mm GKBI - with cylinder cam lock

4.4.1 Air permeability - cylinder cam lock:

Table 13 Measured values for positive pressure on upper surface

Pressure difference in Pa / Flow rate (volume)		50	100	150	200	250	300	450	600
Absolute	**m³/h *)**	0.0	0.2	0.2	0.2	0.2	0.2	0.3	0.4

Table 14 Measured values for negative pressure on upper surface

Pressure difference in Pa / Flow rate (volume)		50	100	150	200	250	300	450	600
Absolute	**m³/h *)**	0.0	0.1	0.2	0.2	0.2	0.2	0.2	0.3

*) Measuring accuracy: 0.1 m³/h

4.4.2 Air permeability - aluminium access panel System F2 – AKL with cylinder cam lock

Joint length: 3.98 m
Overall area of test specimen: 1.12 m²

Table 15 Measured values for positive pressure on upper surface

Pressure difference in Pa / Flow rate (volume)		50	100	150	200	250	300	450	600
Absolute	**m³/h *)**	0.0	0.4	0.5	0.5	0.5	0.5	0.8	1.3
Joint length related	**m³/hm**	0.00	0.10	0.13	0.13	0.13	0.13	0.20	0.33
Area related	**m³/hm²**	0.00	0.36	0.44	0.44	0.44	0.44	0.71	1.16

Table 16 Measured values for negative pressure on upper surface

Pressure difference in Pa / Flow rate (volume)		50	100	150	200	250	300	450	600
Absolute	**m³/h *)**	0.0	0.2	0.5	0.5	0.5	0.6	0.6	0.8
Joint length related	**m³/hm**	0.00	0.05	0.13	0.13	0.13	0.15	0.15	0.20
Area related	**m³/hm²**	0.00	0.18	0.44	0.44	0.44	0.53	0.53	0.71

*) Measuring accuracy is 0,1 m³/h. Added values from tables 5 or 6 and Tables 8 or 9.

The joint-length related permeability and the area-related air permeability for positive pressure (red) and negative pressure (blue) are plotted in diagrams 7 and 8.

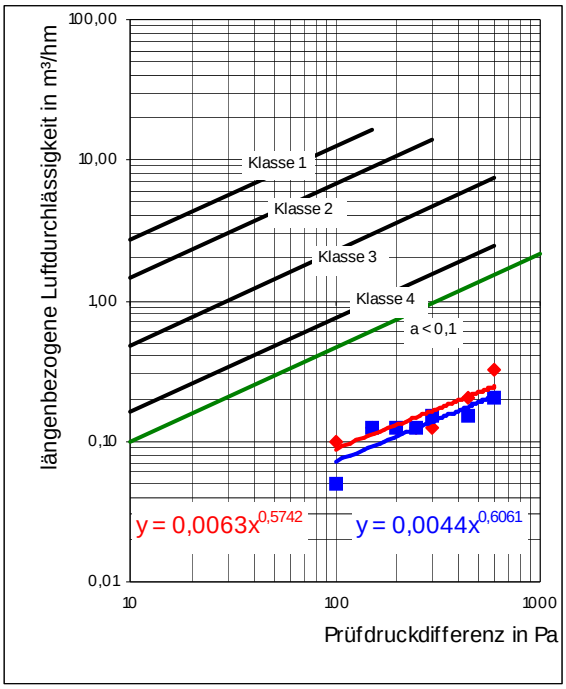


Diagram 7 Joint-length related
air permeability
red = positive pressure
blue = negative pressure

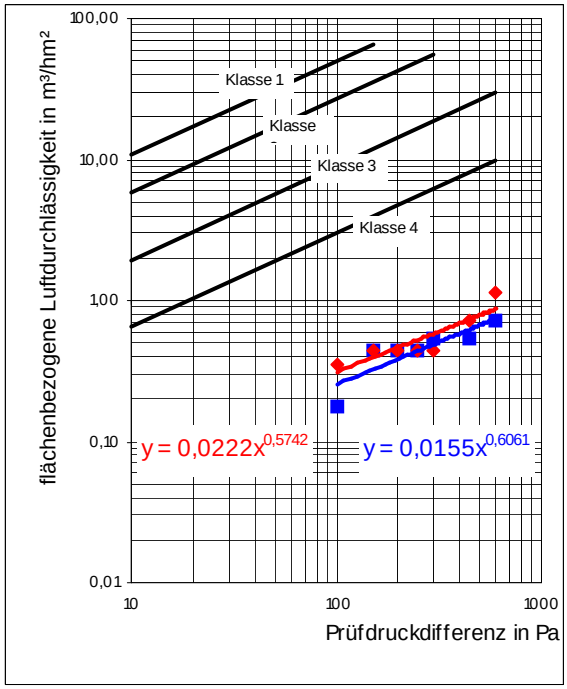


Diagram 8 Area-related
air permeability
red = positive pressure
blue = negative pressure

Table 17 Reference permeability based on EN 12207

Reference air permeability	Positive pressure	Negative pressure
Related to joint length	**Q_{100} = 0.09 m³/hm**	**Q_{100} = 0.07 m³/hm**
Related to overall area	**Q_{100} = 0.31 m³/hm**	**Q_{100} = 0.25 m³/hm²**

Based on EN 12207 Windows and Doors, air permeability, classification, the aluminium access panel System F2 - AKL with 12.5 mm GKBI qualifies for negative and positive pressure for

Class 4

As regards joint-related air permeability, the requirements for air permeability of linear joint seals as per DIN 4108-2 are fulfilled with

$a < 0.1\ m^3/[h\ m\ (daPa)^{2/3}]$

(green limit curve, diagram 7).

4.5 Results of test specimen 2 – aluminium access panel System F2 – AKL with 12.5 mm GKBI - with pin fastener

The specimen with pin fastener did not exhibit any measurable air passage through the lock. The version using pin fastener has no effect on the results given in Section 4.2 (access panel without lock).

4.6 Validity of test results

The values mentioned in this test report refer solely to the objects described and tested under Section 2.

4.7 Extrapolation of test results

The measured results were obtained from the product in new condition. Thus they do not include any changes that are likely to be caused by the effects of weathering and/or ageing.

The test results obtained can be extrapolated for vertical installation positions and for units of identical or smaller dimensions of the same design and type of rebate/installation provided that consistent quality of workmanship is guaranteed by adequate control measures, and the material used as well as the make/details comply with the description of this test report.

5 Notes on using ift test documents

The enclosed **ift** Leaflet "Conditions and Guidance for the Use of **ift** Test Document" sets out the rules for using the test reports.

ift Rosenheim
16.11.2012

Jörn Peter Lass, Dipl.-Ing. (FH)
Head of Testing Department
Building Components

Wolfgang Jehl, Dipl.-Ing. (FH)
Operating Product Officer
Building Material & Semifinished Products