

# Test Report



Number	18-002246-PR01 (PB-A01-02-en-02)
Owner (Client)	Salamander Industrie-Produkte GmbH Jakob-Sigle-Str. 58 86842 Türkheim Germany
Product	<b>Fixed light with mullion</b>
Designation	Shipping name: <b>Streamline 60</b>
Details	Manufacturer Salamander, Industrie-Produkte GmbH - Türkheim; Material Polyvinyl Chloride unplasticized (PVC-U) white; Type of opening Fixed; Overall dimensions (W x H) 1400 mm x 1500 mm
Special features	test sequence
Order	Testing of air permeability, watertightness, resistance to wind load
Contents	The test report contains a total of 16 pages and annexe (7 pages).
Note	Replaces Test Report: no. 18-002246-PR01 PB-A01-02-en-01 dated 23.08.2018. The test report shall only be published in its unabbreviated form. The “Guidance Sheet for the Use of ift Test Documents” applies.

Ve-PB0-4390-eriv (01.12.2017)



## 1 Execution

### 1.1 Sampling and product description

The following details have been presented to ift:

Sampler: Salamander Industrie-Produkte GmbH, 86842 Türkheim (Germany)  
Sampling date: 23.07.2018  
Evidence: A sampling report has been presented to ift.  
Date of delivery: 14.08.2018  
Description: For product identification the specimen tested is described/represented in the Annex. Material specifications, item numbers and other company-specific descriptions are details provided by the client and will be checked for plausibility by ift.

Test specimen no.: 18-002246-PK01 / WE: 46513-001

### 1.2 Basic documents \*) of the procedures

EN 1026:2016 - 03  
Windows and doors - Air permeability - Test method  
EN 1027:2016 - 03  
Windows and doors - Watertightness - Test method  
EN 12211:2016 - 03  
Windows and doors - Resistance to wind load - Test method

\*) and the relevant national versions, e.g. DIN EN

### 1.3 Short description of the procedures

The tests were performed according to the following sequence:

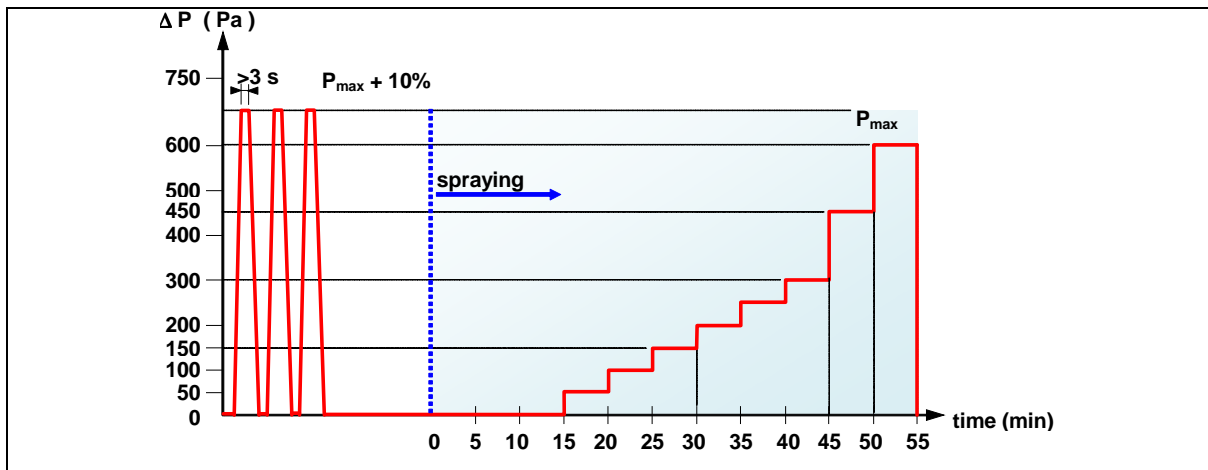
- Air permeability
- Watertightness
- Resistance to wind load
- Air permeability - Repeated test after wind load test
- Resistance to wind load - Safety test

Testing of air permeability, watertightness, resistance to wind load

Watertightness according to EN 1027:2016-03

Prior to the test, three positive pressure pulses were applied to the test specimen. Subsequently, the external surface of the test specimen was constantly sprayed with water through nozzles, conforming to the standard. After a 15-minute pressureless spraying period an additional overpressure in terms of subsequent pressure steps was applied. The pressure steps were defined by the standard and were kept for 5 minutes each (see illustration). Watertightness was tested up to the maximum test pressure difference.

The water volume applied and the angle of spray depend on the intended type of installation of the component (protected / unprotected) and the height of the component (< / > 2.5 m) according to the standard. The required water volume and the angle of spray are documented in the measuring data sheet.



**Illustration** Test sequence for watertightness



Testing of air permeability, watertightness, resistance to wind load

Air permeability according to EN 1026:2016-03

Leakages of the test set-up were made visible using artificially generated fog and were sealed using permanently resilient sealant.

Air permeability was tested for the respective pressure steps at negative pressure and positive pressure in accordance with the following diagram. At the beginning of each measurement the test specimen was exposed to three pressure pulses.

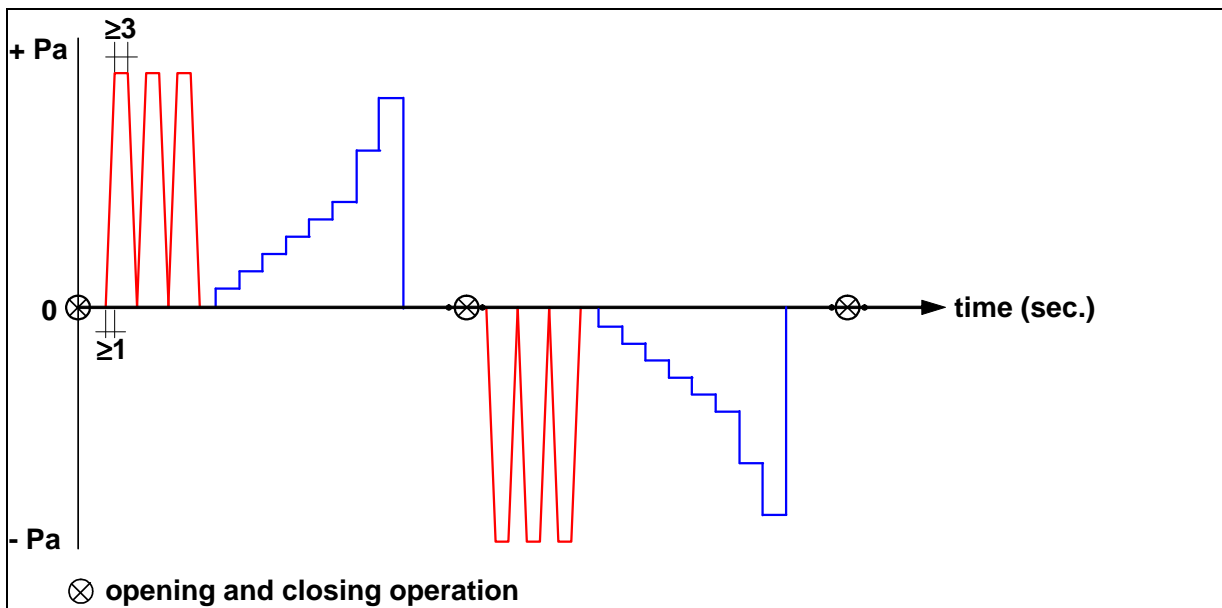
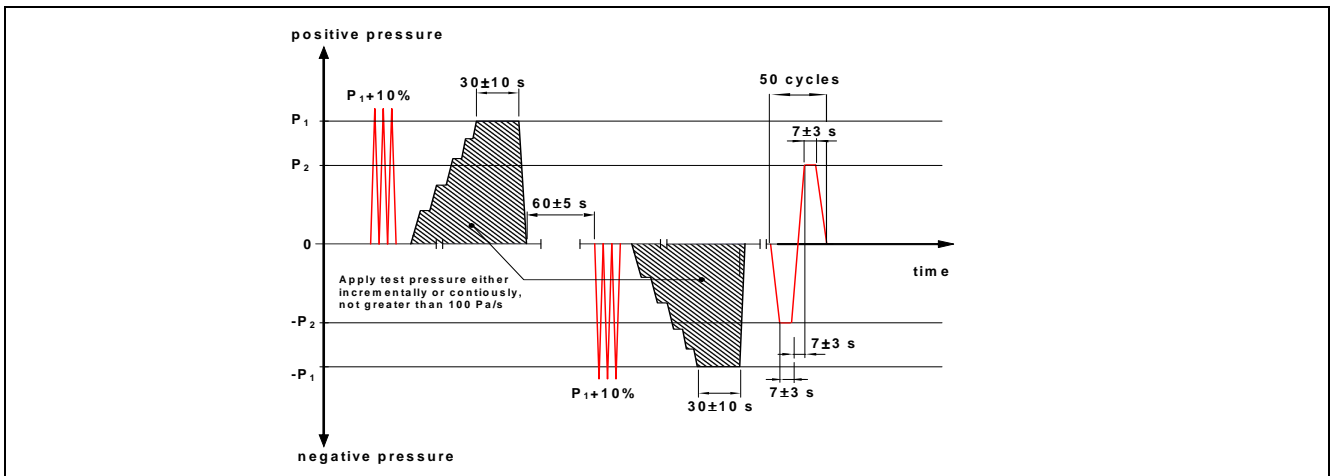


Illustration Test sequence for air permeability

Testing of air permeability, watertightness, resistance to wind load

Resistance to wind load according to EN 12211:2016-03

Resistance to wind load was tested in accordance with the standard and conducted in steps at positive pressure and negative pressure up to the test pressure p1. The test specimen was exposed to three pressure pulses  $\Delta p1 + 10\%$ . This was followed by determination of the frontal deflection of test specimen for each pressure step when exposed to positive test pressure  $\Delta p1$  and negative test pressure  $-\Delta p1$ . Then the test specimen was subjected to 50 cycles including alternating positive and negative pressures of  $\pm \Delta p2 = \Delta p1 - 50\%$ .



**Illustration** Test sequence for resistance to wind load - Deflection and alternating positive/negative pressures

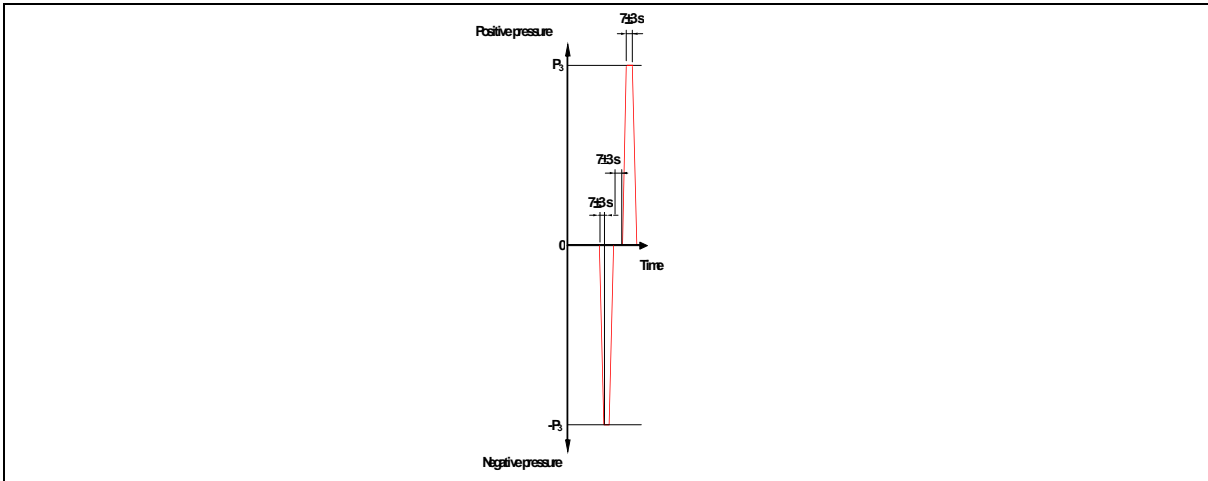
Air permeability - Repetition of test after wind load according to EN 1026:2016-03

Following the static resistance to wind load test (deflection) and alternating positive/negative pressure the test for air permeability was repeated in conformity with EN 12210.



Resistance to wind load - Safety test according to EN 12211:2016-03

The wind resistance test (safety test) was conducted at negative pressure and positive pressure in accordance with EN 12211 up to test pressure  $\Delta p_3 = \Delta p_1 + 50\%$ .



**Illustration** Test sequence for resistance to wind load - safety test

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Testing of air permeability, watertightness, resistance to wind load



## 2 Detailed results

### Air permeability according to EN 1026:2016-03

Project-No.	18-002246-PR01
Basis	EN 1026:2016-03 Windows and doors - Air permeability - Test method
Test equipment	DM/020521 - Torque wrench Pst/020920 - Window and facade test rig
Test specimen	Fixed light with mullion
Test specimen No.	46513-001
Date of test	20.08.2018
Test engineer in charge	Daniel Gromotka
Test engineer	Lars Kristen
Implementation of tests Deviations	There have been no deviations from the test method as specified in the standard/basis.
Ambient conditions	Temperature 27 °C    Air humidity 44 %    Air pressure 965 hPa The ambient conditions are in accordance with the standard/basis requirements.

### Measurement data/Results


Closing condition	closed and locked
Size of window frame	1400 mm    x    1500 mm
Area of test specimen	2,10 m <sup>2</sup>




Testing of air permeability, watertightness, resistance to wind load

Initial load before positive wind pressure and negative wind pressure: 660 Pa


**Table:** Air permeability at positive wind pressure

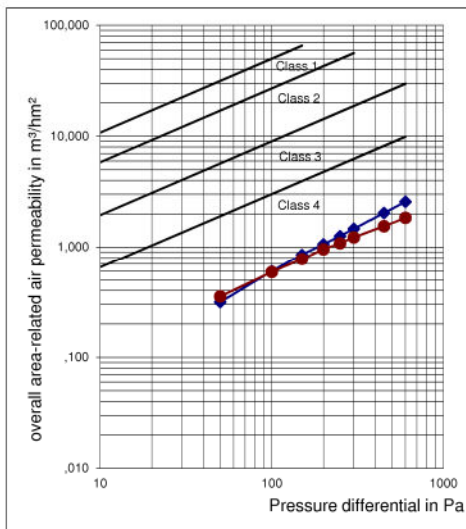
Measured results at positive wind pressure 	Pressure differential Pa	50	100	150	200	250	300	450	600
	Flow rate (volume) m³/h	0,7	1,3	1,8	2,2	2,6	3,1	4,3	5,4
	Overall area-related m³/hm²	0,31	0,60	0,85	1,06	1,26	1,46	2,03	2,56

**Table:** Air permeability at negative wind pressure

Measured results at negative wind pressure 	Pressure differential Pa	50	100	150	200	250	300	450	600
	Flow rate (volume) m³/h	0,7	1,2	1,6	2,0	2,3	2,6	3,2	3,9
	Overall area-related m³/hm²	0,35	0,59	0,78	0,95	1,09	1,22	1,55	1,84

**Table:** Air permeability from average values from positive and negative wind pressures

Average value from positive and negative wind pressures 	Pressure differential Pa	50	100	150	200	250	300	450	600
	Flow rate (volume) m³/h	0,7	1,2	1,7	2,1	2,5	2,8	3,8	4,6
	Overall area-related m³/hm²	0,3	0,6	0,8	1,0	1,2	1,3	1,8	2,2



**Diagram:** Overall area-related air permeability (positive and negative wind pressures)

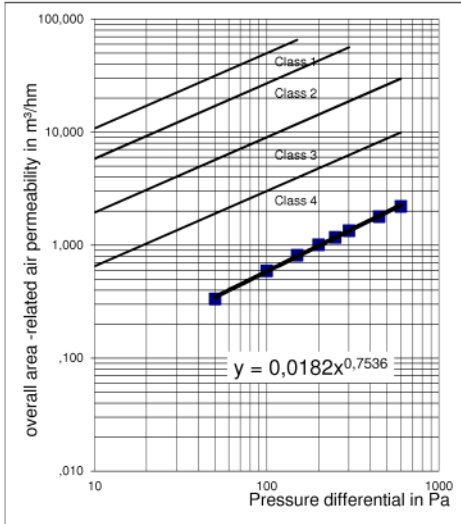


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Testing of air permeability, watertightness, resistance to wind load



**Diagram:** Overall area-related air permeability (average value from positive and negative wind pressures)

**Table:** Measured results

Reference air permeability related to joint length	Q100 < 0,10 m³/hm
Reference air permeability related to overall area	Q100 = 0,59 m³/hm²

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Testing of air permeability, watertightness, resistance to wind load



### Watertightness according to EN 1027:2016-03

Project-No. 18-002246-PR01  
Basis EN 1027:2016-03  
Windows and doors - Watertightness - Test method  
Test equipment Pst/020920 - Window and facade test rig  
Test specimen Fixed light with mullion  
Test specimen No. 46513-001  
Date of test 20.08.2018  
Test engineer in charge Daniel Gromotka  
Test engineer Lars Kristen

#### Implementation of tests

Deviations There have been no deviations from the test method as specified in the standard/basis.

Ambient conditions Temperature 27 °C Air humidity 44 % Air pressure 965 hPa  
The ambient conditions are in accordance with the standard/basis requirements.

### Measurement data/Results

Closing condition closed and locked  
Size of window frame 1400 mm x 1500 mm  
Spray method A (Spray angle 24°)  
Number of spray nozzles 4 Lower nozzle line 0  
Water amount 480 l/h Water amount 0 l/h  
0.48 m³/h 0.00 m³/h  
Initial load before positive wind pressure was applied.

Testing of air permeability, watertightness, resistance to wind load

View of test specimen

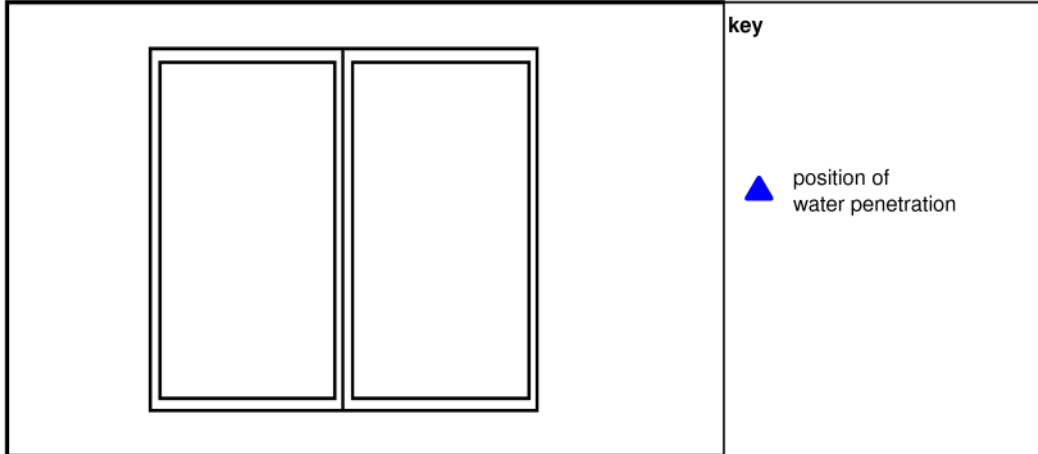


Table: Test

Pressure/Pa	Notice
0	no water penetration
50	no water penetration
100	no water penetration
150	no water penetration
200	no water penetration
250	no water penetration
300	no water penetration
450	no water penetration
600	no water penetration
750	no water penetration
900	no water penetration
1050	no water penetration
1200	no water penetration
1350	no water penetration
1500	no water penetration

No water penetration at up to 1500 Pa detected.

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Testing of air permeability, watertightness, resistance to wind load

**Resistance to wind load according to EN 12211:2016-03**

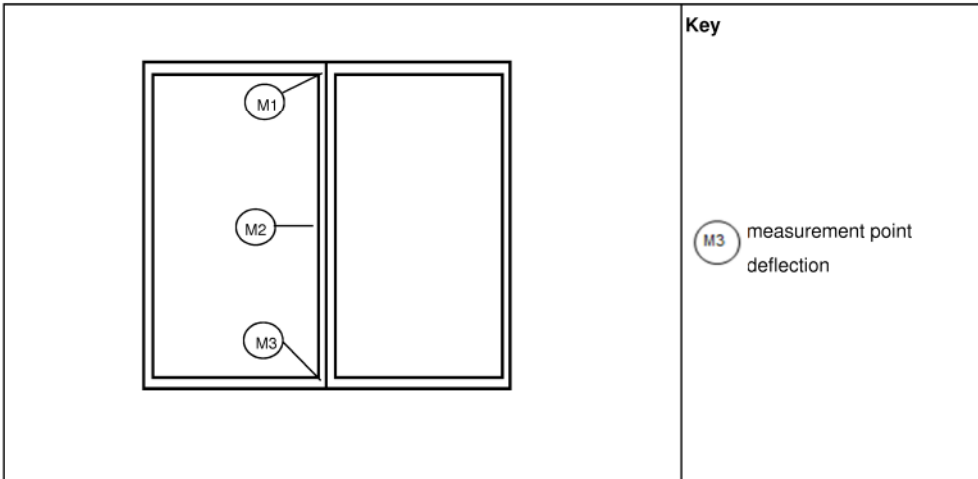
Project-No. 18-002246-PR01  
Basis EN 12211:2016-03  
Windows and doors - Resistance to wind load - Test method  
Test equipment Pst/020920 - Window and facade test rig  
Test specimen Fixed light with mullion  
Test specimen No. 46513-001  
Date of test 21.08.2018  
Test engineer in charge Daniel Gromotka  
Test engineer Lars Kristen

Implementation of tests  
Deviations There have been no deviations from the test method as specified in the standard/basis.

Ambient conditions Temperature 22 °C Air humidity 64 % Air pressure 965 hPa  
The ambient conditions are in accordance with the standard/basis requirements.

**Measurement data/Results**

Closing condition closed and locked





Testing of air permeability, watertightness, resistance to wind load

Maximum test pressure: ± 2000 Pa 3 pressure pulses of 2200 Pa

Table: Maximum deflection for classification at effective span  $l = 1500$  mm

Class		maximum permissible relative deflection in mm
A	( $l/150$ )	10.0
B	( $l/200$ )	7.5
C	( $l/300$ )	5.0

Table: Measured results of frontal deflection in mm at negative / positive wind pressures

	$p_1$ in Pa	Positive wind pressure					Negative wind pressure				
		400	800	1200	1600	2000	-400	-800	-1200	-1600	-2000
Measured results of frontal deflection in mm	M1 in mm					1.1					1.1
	M2 in mm					3.1					3.3
	M3 in mm					0.7					0.8
	$f_{rel}$ in mm					2.2					2.3
	$l/f_{rel}$					680					652

Table: Permanent deformation measured at 0 Pa after 60 seconds

		Positive pressure	Negative pressure
		Permanent deflection	M1 in mm
	M2 in mm	0.0	0.0
	M3 in mm	0.0	0.0
	$f_{rel}$ in mm	0.0	0.0

**Key**

- $p_1, p_2$  Test pressure
- M1, M2, M3 Frontal dislodgement at measurement points M1, M2, M3
- $f_{rel}$  Frontal deflection
- $l$  Effective span

**Dynamic wind loads (negative / positive pressures)**

Table: pressure pulses

$p_2$ in Pa	200	400	600	800	1000
passed					✓

50 cycles at  $p_2 \pm 1000$  Pa

**Malfunctions at test specimen**

At the test specimen were no malfunctions detected.

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Testing of air permeability, watertightness, resistance to wind load



### Air permeability - Repetition of test after wind load according to EN 1026:2016-03

Project-No. 18-002246-PR01  
Basis EN 1026:2016-03  
Windows and doors - Air permeability - Test method  
Test equipment Pst/020920 - Window and facade test rig  
Test specimen Fixed light with mullion  
Test specimen No. 46513-001  
Date of test 21.08.2018  
Test engineer in charge Daniel Gromotka  
Test engineer Lars Kristen

Implementation of tests  
Deviations There have been no deviations from the test method as specified in the standard/basis.

Ambient conditions Temperature 22 °C Air humidity 64 % Atmospheric pressure 695 hPa  
The ambient conditions are in accordance with the standard/basis requirements.

### Measurement data/Results

Closing condition closed and locked  
Size of window frame 1400 mm x 1500 mm  
Area of test specimen 2,10 m<sup>2</sup>

Subsequent to the test of resistance to wind load by application of test pressures  $p_1$  and  $p_2$ , the upper limit of the achieved air permeability class must not be exceeded by more than 20% as set out by EN 12207.

The requirements were fulfilled.

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Testing of air permeability, watertightness, resistance to wind load

**Resistance to wind load - Safety test according to EN 12211:2016-03**

Project-No. 18-002246-PR01  
Basis EN 12211:2016-03  
Windows and doors - Resistance to wind load - Test method  
Test equipment Pst/020920 - Window and facade test rig  
Test specimen Fixed light with mullion  
Test specimen No. 46513-001  
Date of test 21.08.2018  
Test engineer in charge Daniel Gromotka  
Test engineer Lars Kristen

Implementation of tests  
Deviations There have been no deviations from the test method as specified in the standard/basis.

Ambient conditions Temperature 22 °C Air humidity 64 % Atmospheric pressure 965 hPa  
The ambient conditions are in accordance with the standard/basis requirements.

**Measurement data/Results**

**Safety test**

**Table:** Pressure steps

		Positive wind pressure					Negative wind pressure				
p <sub>3</sub>	Pa				3000					-3000	
passed					✓					✓	

Safety test passed at up to p3 ± 3000 Pa.

**Malfunctions at test specimen**

At the test specimen were no malfunctions detected.



Testing of air permeability, watertightness, resistance to wind load

### 3 Summary

#### 3.1 Result

The test results are shown in the measuring data sheet, see item "Detailed results".

#### 3.2 Instructions for use

This test/evaluation does not allow any statement to be made on further characteristics of the present structure regarding performance and quality, in particular the effects of weathering and ageing.

The test was performed according to standard and the details for identification of the test specimen are complete; on the basis of this Test Report an "ift-Nachweis" (Evidence) can be issued.

ift Rosenheim  
12.09.2018

A handwritten signature in blue ink, appearing to read 'Thomas Stefan'.

Thomas Stefan, Dipl.-Ing. (FH)  
Head of Testing Department  
Building Component Testing

A handwritten signature in blue ink, appearing to read 'Daniel Gromotka'.

Daniel Gromotka, B.Eng.  
Operating Testing Officer  
Building Component Testing



## Test Report

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Die Beschreibung des geprüften Probekörpers dient der normkonformen Identifizierung des Produkttyps, für den die festgestellten Werte gelten. Alternativ zur vorgegebenen tabellarischen Datenerfassung kann die Beschreibung auch in Form von technischen Zeichnungen, Verarbeitungsrichtlinien, Stücklisten etc. erfolgen. Zusätzliche Produktdetails bitte ergänzen.

Die \*Mindest-Angaben sind Voraussetzung für die Erstellung eines ift-Nachweises. Nur bei Angabe aller in diesem Dokument angeforderten Daten ist ggf. eine nachträgliche Gutachtliche Stellungnahme möglich. Alle \*Mindest-Angaben des Auftraggebers werden vom ift auf Plausibilität geprüft; ggf. festgestellte Abweichungen und/oder ergänzende Feststellungen werden dokumentiert.

The description of the specimen to be tested serves to identify, in conformity with the standards, the product type, for which the values determined will apply. Alternatively to the specified tabulated data collection, the description may also be made by technical drawings, processing instructions, parts lists, etc. Please supplement additional product details.

The \*minimum details are the precondition for issuing the "ift-Nachweis". Only upon provision of all requested data subsequently requested Expert Statements may be issued. All \*minimum details provided by the client will be checked for plausibility by ift, any deviations observed and/or additional findings will be documented.

## \* Mindestangaben

\* minimum details

Alle Maßangaben in mm

All dimensions in mm

Nicht Zutreffendes bitte löschen.

Please delete non-appropriate.

Wareneingang-Nr.: 46513-001

ID of goods received :

ift Mitarbeiter: kl

ift staff member :

<b>Eigenschaft</b> Characteristic	<b>Angaben des Auftraggebers (unverändert)</b> Information provided by client (unchanged)
<b>Produkt</b> Product	* Festverglasung mit Mittelpfosten Fixed light with mullion
Hersteller Manufacturer	* Fa. Salamander Industrie- Produkte GmbH
Bezeichnung Designation	* Streamline 60
Profilsystem Profile system	* Streamline 60
Öffnungsart, Öffnungs- richtung Type of opening, opening direction	* Festverglasung Fixed light
Rahmenmaterial Frame material	* PVC/U weiß uPVC white
Blendrahmenaußenmaß (B x H) Overall frame dimensions (W x H)	* 1400 mm x 1500 mm
Flügelaußenmaß (B x H) Overall casement dimensions (W x H)	* - -
<b>Blendrahmen</b> Frame member	
Bezeichnung / Typ / Art.-Nr. Designation / type / item no.	* Blendrahmen 240 020 mit Verstärkungsprofil 445 020, näheres siehe Zeichnungen __ with reinforcing profile __, further details are given in drawings
Rahmenverbindung Frame joint	* Blendrahmen auf Gehrung geschnitten und verschweißt Mitred and welded

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<b>Eigenschaft</b> Characteristic	<b>Angaben des Auftraggebers (unverändert)</b> Information provided by client (unchanged)
<b>Zusatzprofile</b> (falls vorhanden): Supplementary profiles (if appropriate):	
<b>Bezeichnung / Typ / Art.-Nr.</b> Designation / type / item no.	Pfosten 242 020 mit Verstärkungsprofil 445 020, näheres siehe Zeichnungen mullion__ with reinforcing profile __, further details are given in drawings
<b>Rahmenverbindung</b> Frame joint	*Mechanische T-Verbindung mit Verbinder Nr. 248 020 (Pfosten gekontert und mit Pfostenverbinder 248 020 verschraubt) Secured and dowelled Mechanical T-joint with T-connector No. __
<b>Bezeichnung / Typ / Art.-Nr.</b> Designation / type / item no.	Lisenenprofil 656 330 mit Verstärkungsprofil 655 030, Verschraubung in Pfostenstahl
<b>Rahmenverbindung</b> Frame joint	* - -
<b>Falzausbildung</b> Rebate design	
<b>Falzentwässerung</b> Rebate drainage	*Im Glasfalz: Je Feld 2 Schlitzte 4 mm x 30 mm, nach außen: 3 Schlitzte 4 mm x 30 mm, ohne Abdeckkappen Inside rebate: __ slots of __ mm x __ mm, to outside front: __ slots __ mm x __ mm, without cover caps
<b>Druckausgleich Belüftung</b> Pressure equalisation	*Im Glasfalz: Je Feld 2 Bohrungen Ø 8 mm, nach außen: Je Feld 2 Bohrungen Ø 4 mm Inside rebate: __ drillings Ø __ mm, to outside front: __ drillings Ø __ mm
<b>Füllung</b> Infill panel	Floatglas
<b>Glasaufbau</b> Glass configuration	*
<b>Gesamtdicke</b> Total thickness	*8 mm
<b>Einbau der Füllungen</b> Installation of infill panels	2
<b>Verglasungsdichtung außen</b> External glazing gasket	
<b>Hersteller / Lieferant</b> Manufacturer / supplier	Fa. Salamander Industrie- Produkte GmbH
<b>Bezeichnung / Typ / Art.-Nr.</b> Designation / type / item no.	*Verglasungsdichtung 414 573
<b>Material</b> Material	*EPDM EPDM
<b>Eckausbildung</b> Corner design	*Umlaufend, oben mittig stumpf gestoßen und verklebt Continuous, at top centre butt-jointed and bonded
<b>Verglasungsdichtung innen</b> Internal glazing gasket	
<b>Hersteller / Lieferant</b> Manufacturer / supplier	Fa. Salamander Industrie- Produkte GmbH

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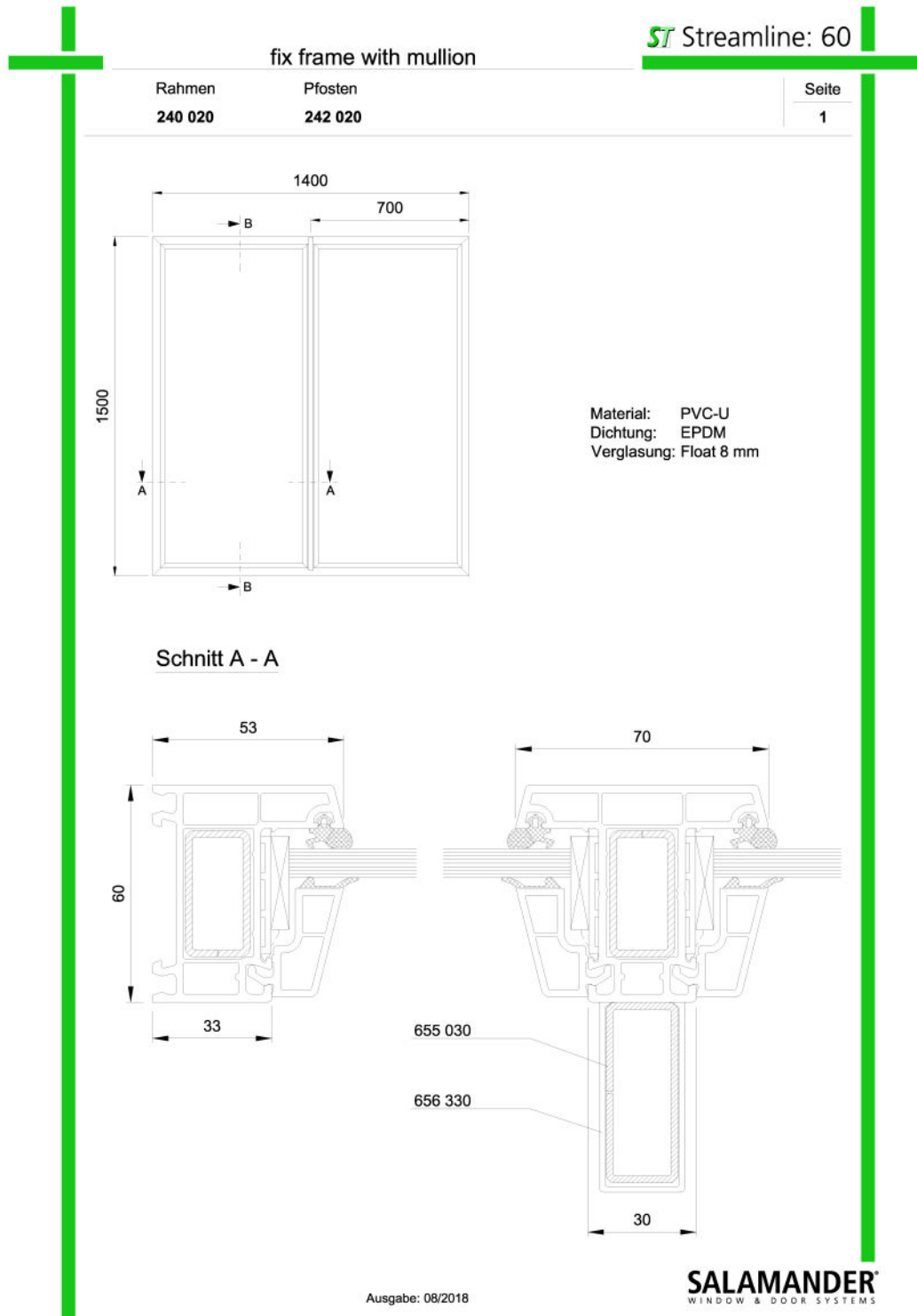


<b>Eigenschaft</b> Characteristic	<b>Angaben des Auftraggebers (unverändert)</b> Information provided by client (unchanged)
Artikelnummer Item no.	*Glasleiste 413 833 mit anextrudierter Dichtung
Material Material	*Dichtung: PVC-P
Eckausbildung Corner design	*auf Gehrung geschnitten und gestoßen Mitred and welded
<b>Glshalteleiste</b> <b>Glazing bead</b>	
Typ Type	*Glasleiste 413 833
Eckausbildung Corner design	*auf Gehrung geschnitten und gestoßen Mitred and jointed
Befestigung Fixing method/fasteners	*geklemmt Clamped
<b>Befestigung des Probekörpers am Montagerahmen / an die Tragkonstruktion</b> <b>Fixing of test specimen to sub-frame / supporting construction</b>	
Material Montagerahmen Material of subframe	*Holzrahmen geschraubt und mit spritzbarem Dichtstoff abgedichtet Wooden frame screwed and sealed with extrudable sealant
Befestigungsmittel Fasteners	*
Schraubentyp Screw type	*SFS intec: FB-SK-T30
Schraubenanzahl Number of screws	*12
Schraubendimension Screw dimensions	*7,5 x 102 mm
Befestigungsmittel-abstände Fasteners spaced	*
Aus der Ecke From corner	*ca. 150 mm
Dazwischen In-between	*max. 500 mm
Ausführung Design	*Distanzverklotzung zum Holzrahmen im Bereich jeden Befestigungspunktes Spacer blocks towards wood frame on each fixing point
Füllung der Anschlussfuge Infill of installation gap	*Vorhanden, umlaufend und mit spritzbarem Dichtstoff abgedichtet

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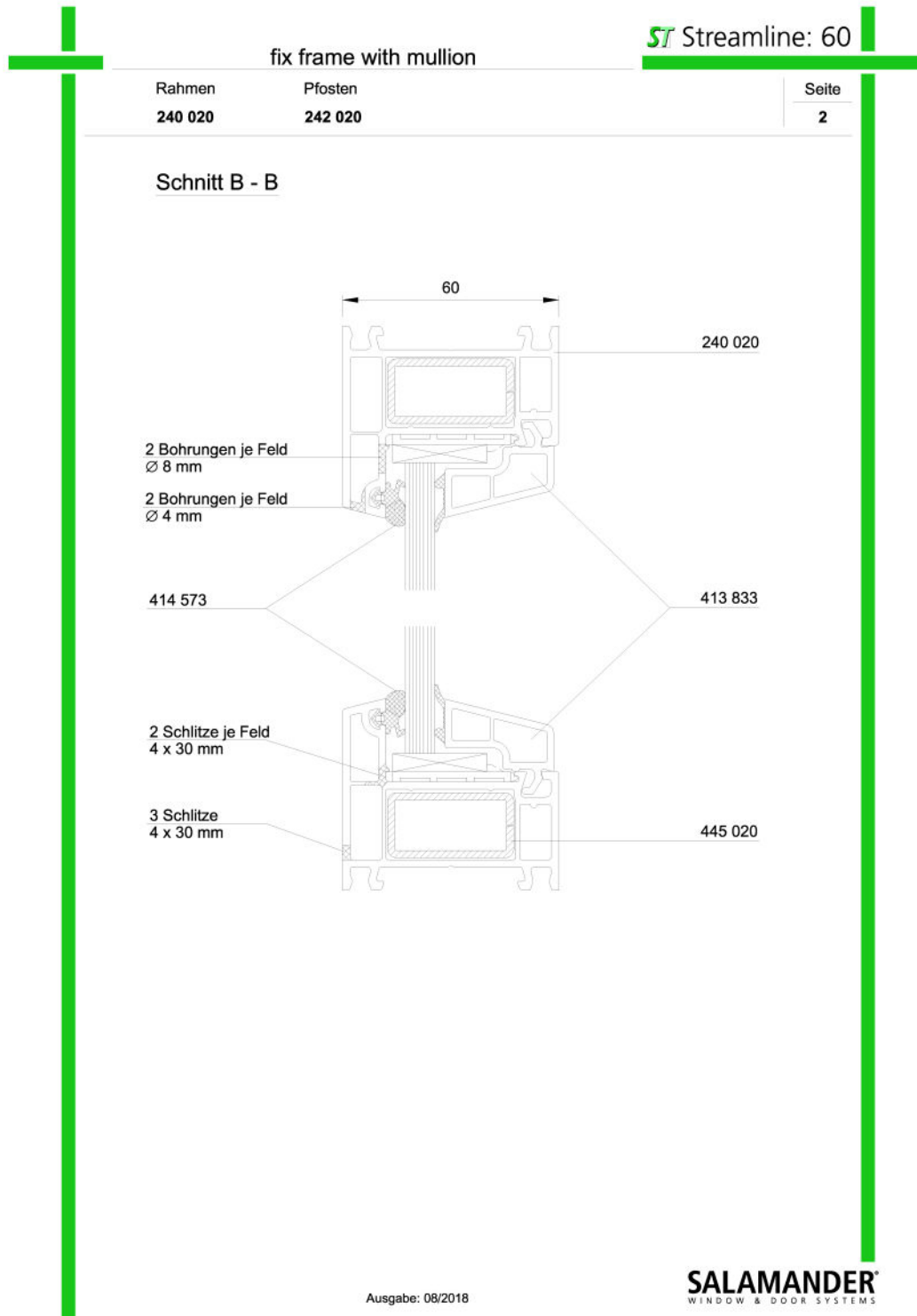


Picture 1 View and vertical section

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Picture 2

Horizontal section

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Picture 1 View of test specimen, seen from inside



Picture 2 View of test specimen, seen from outside



Picture 3 Internal corner design



Picture 4 External corner design



Picture 5 Central meeting joint, at top



Picture 6 Central meeting joint, at bottom

**Attachment 3: Photo documentation of test specimen**

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Picture 7 Drainage