

Test Report



Number	18-002246-PR03 (PB-A01-0203-en-01)
Owner (Client)	Salamander Industrie-Produkte GmbH Jakob-Sigle-Str. 58 86842 Türkheim Germany
Product	Tilt and turn window
Designation	Shipping name: Streamline 60
Details	Manufacturer Salamander, Industrie-Produkte GmbH - Türkheim; Material Polyvinyl Chloride unplasticized (PVC-U) white; Type of opening Tilt and turn; Opening direction DIN right, inward opening; Overall dimensions (W x H) 1050 mm x 1550 mm
Special features	test sequence
Order	Testing of air permeability, watertightness, resistance to wind load, operating forces
Contents	The test report contains a total of 17 pages and annexe (9 pages).
Note	The test report shall only be published in its unabbreviated form. The "Guidance Sheet for the Use of ift Test Documents" ap- plies.

Ve-PB0-4390-en/ (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-PK03 / WE: 46513-003

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 12046-1:2003 - 11
Operating forces - Test method - Part 1: Windows
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:

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

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.

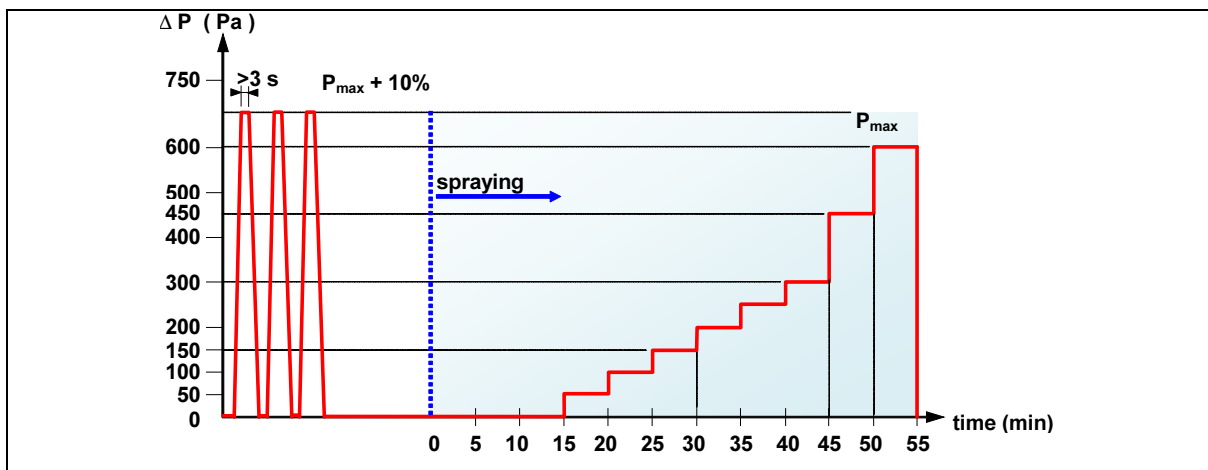


Illustration Test sequence for watertightness

Operating forces according to EN 12046-1:2003-11

Before starting the first measurement, the test specimen was manually operated 5 times with all relevant hardware operated and fully engaged.

During the test the minimum static force and/or torque was measured required

- to release and/or lock the hardware (locks or handles);
- to commence opening and
- to complete closing of the casement and/or sash.

Testing of air permeability, watertightness, resistance to wind load, operating forces

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.

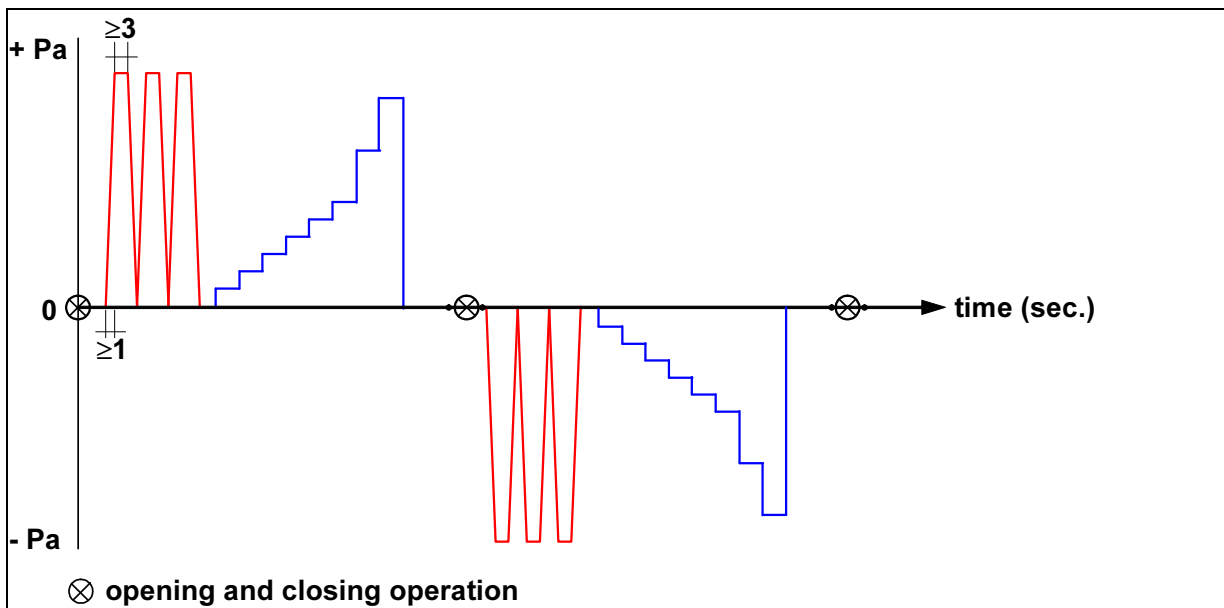


Illustration Test sequence for air permeability

Testing of air permeability, watertightness, resistance to wind load, operating forces

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 p_1 . The test specimen was exposed to three pressure pulses $\Delta p_1 + 10\%$. This was followed by determination of the frontal deflection of test specimen for each pressure step when exposed to positive test pressure Δp_1 and negative test pressure $-\Delta p_1$. Then the test specimen was subjected to 50 cycles including alternating positive and negative pressures of $\pm \Delta p_2 = \Delta p_1 - 50\%$.

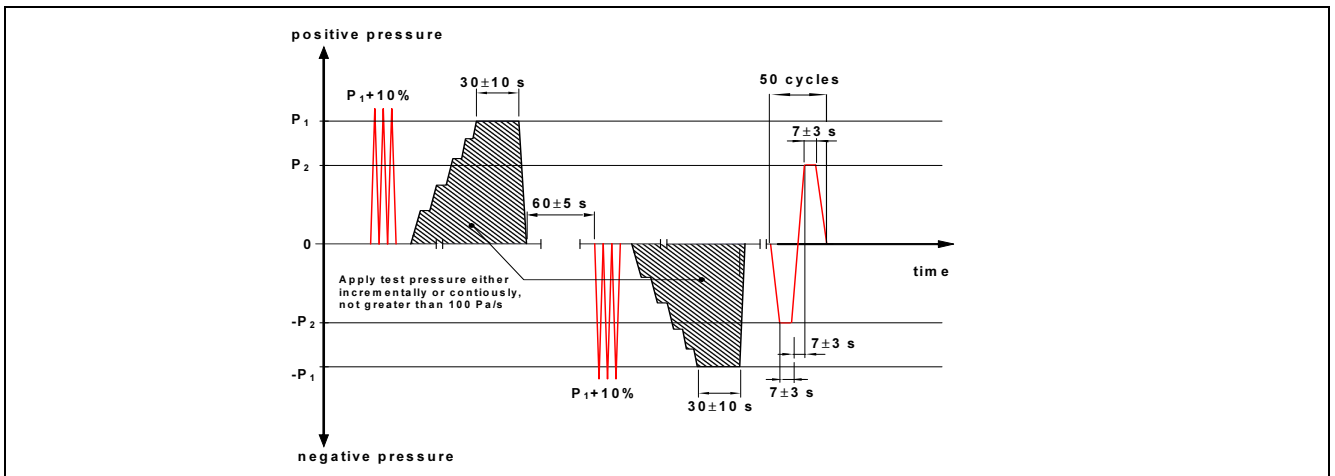


Illustration Test sequence for resistance to wind load - Deflection and alternating positive/negative pressures

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 $\Delta p_3 = \Delta p_1 + 50\%$.

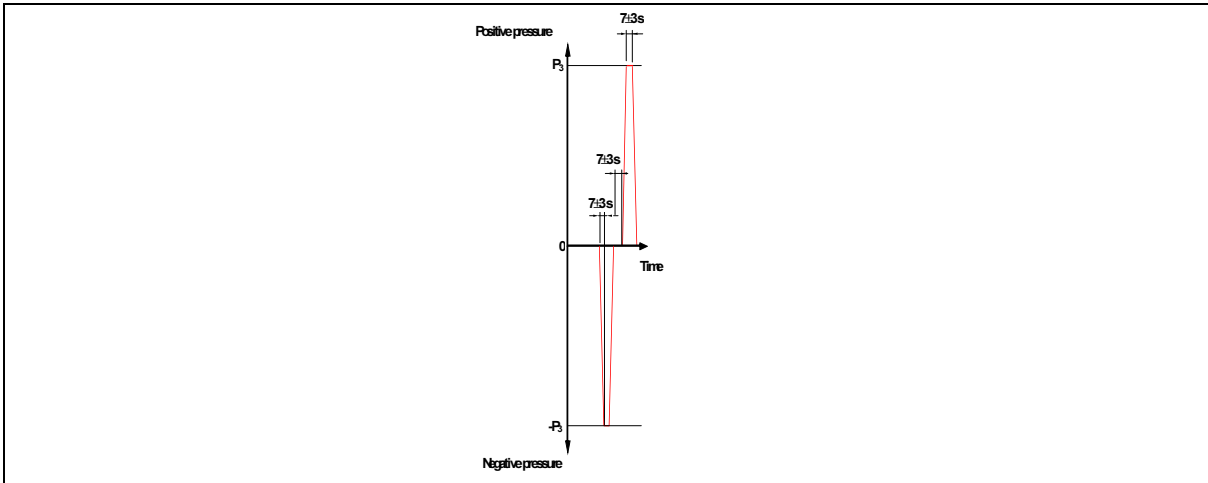


Illustration Test sequence for resistance to wind load - safety test

2 Detailed results

Operating forces according to EN 12046-1:2003-11

Project-No.	18-002246-PR03
Basis	EN 12046-1:2003-11 Operating forces - Test method - Part 1: Windows
Test equipment	DM/020521 - Torque wrench
Test specimen	Tilt and turn window
Test specimen No.	46513-003
Date of test	22.08.2018
Test engineer in charge	Daniel Gromotka
Test engineer	Daniel Gromotka
Implementation of tests Deviations	There have been no deviations from the test method as specified in the standard/basis.
Ambient conditions	Temperature 28.0 °C Air humidity 46 % The ambient conditions are in accordance with the standard/basis requirements.

Measurement data/Results

Test of main mode of operation

Pivot arm	0,13 m
Grip height	0,60 m

Table: Measurement operating forces for the release / locking operating

Measured values	1	2	3	Average value M
in Nm	7.3	7.2	7.2	7.2

Table: Measurement of force required for opening (turn)

Measured values	1	2	3	Average value M
in N	4.0	3.5	3.3	3.6

Table: Measurement of force required for opening (tilt)

Measured values	1	2	3	Average value M
in N	14.2	14.3	14.2	14.2

Table: Measurement of force for complete closing (turn)

Measured values	1	2	3	Average value M
in N	3.8	3.6	3.4	3.6

Table: Measurement of force for complete closing (tilt)

Measured values	1	2	3	Average value M
in N	76.0	69.8	71.5	72.4

Malfunctions at test specimen

At the test specimen were no malfunctions detected.

Testing of air permeability, watertightness, resistance to wind load, operating forces



Air permeability according to EN 1026:2016-03

Project-No. 18-002246-PR03
 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 Tilt and turn window
 Test specimen No. 46513-003
 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 23 °C Air humidity 63 % Air pressure 966 hPa
 The ambient conditions are in accordance with the standard/basis requirements.

Measurement data/Results

Closing condition closed and locked
 Size of window frame 1050 mm x 1550 mm
 Size of active casement 1000 mm x 1500 mm
 Area of test specimen 1,63 m²
 Length of opening joints 5,00 m

Table: Measurement of operating forces

Individ. measured result	1	2	3	Average value
in Nm	8,0	8,9	9,3	8,7



Testing of air permeability, watertightness, resistance to wind load, operating forces

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	1,1	1,8	2,3	2,7	3,2	3,6	4,8	5,7
	Joint length-related m³/hm	0,23	0,36	0,47	0,55	0,64	0,72	0,95	1,15
	Overall area-related m³/hm²	0,70	1,11	1,43	1,69	1,98	2,22	2,92	3,53

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	1,1	1,8	2,3	2,7	3,0	3,4	4,3	4,9
	Joint length-related m³/hm	0,22	0,35	0,45	0,53	0,60	0,68	0,85	0,98
	Overall area-related m³/hm²	0,68	1,08	1,38	1,64	1,84	2,09	2,62	3,01

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	1,1	1,8	2,3	2,7	3,1	3,5	4,5	5,3
	Joint length-related m³/hm	0,2	0,4	0,5	0,5	0,6	0,7	0,9	1,1
	Overall area-related m³/hm²	0,7	1,1	1,4	1,7	1,9	2,2	2,8	3,3

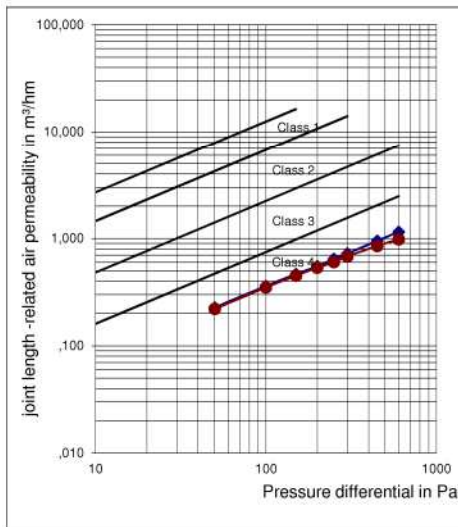


Diagram: Joint length-related air permeability (positive and negative wind pressures)

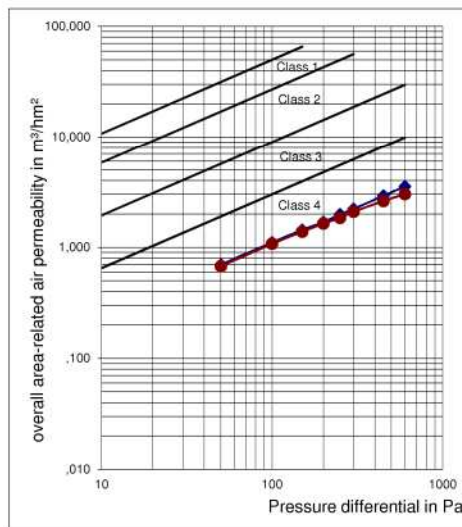


Diagram: Overall area-related air permeability (positive and negative wind pressures)



Testing of air permeability, watertightness, resistance to wind load, operating forces

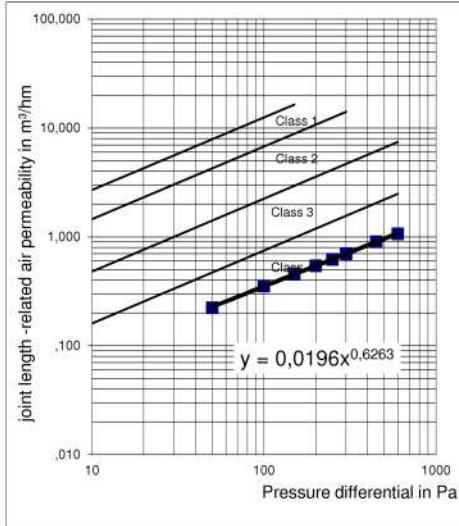


Diagram: Joint length-related air permeability (average value from positive and negative wind pressures)

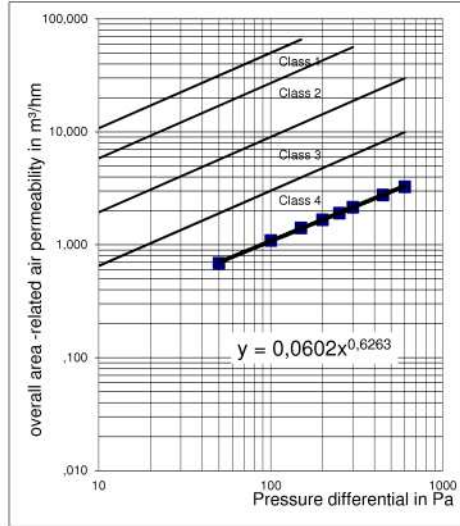


Diagram: Overall area-related air permeability (average value from positive and negative wind pressures)

Table: Measured results

Reference air permeability related to joint length	Q100 = 0,35 m³/hm
Reference air permeability related to overall area	Q100 = 1,08 m³/hm²

Test Report

Page 11 of 17

No. 18-002246-PR03 (PB-A01-0203-en-01) dated 23.08.2018
Owner (client) Salamander Industrie-Produkte GmbH, 86842 Türkheim (Germany)

Testing of air permeability, watertightness, resistance to wind load, operating forces



Watertightness according to EN 1027:2016-03

Project-No. 18-002246-PR03
Basis EN 1027:2016-03
Windows and doors - Watertightness - Test method
Test equipment Pst/020920 - Window and facade test rig
Test specimen Tilt and turn window
Test specimen No. 46513-003
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 23 °C Air humidity 63 % Air pressure 966 hPa
The ambient conditions are in accordance with the standard/basis requirements.

Measurement data/Results

Closing condition closed and locked
Size of window frame 1050 mm x 1550 mm
Spray method A (Spray angle 24°)
Number of spray nozzles 3 Lower nozzle line 0
Water amount 360 l/h Water amount 0 l/h
0.36 m³/h 0.00 m³/h
Initial load before positive wind pressure was applied.

Testing of air permeability, watertightness, resistance to wind load, operating forces

View of test specimen

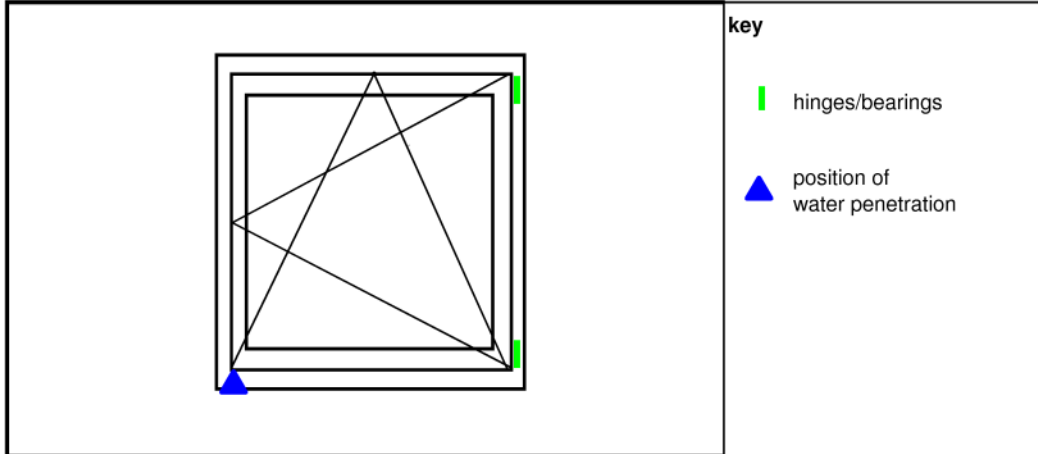


Table: Test

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	Water penetration after 2 Min, above corner sealing

No water penetration at up to 750 Pa detected.

Test Report

Page 13 of 17

No. 18-002246-PR03 (PB-A01-0203-en-01) dated 23.08.2018
Owner (client) Salamander Industrie-Produkte GmbH, 86842 Türkheim (Germany)

Testing of air permeability, watertightness, resistance to wind load, operating forces



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

Project-No.	18-002246-PR03
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	Tilt and turn window
Test specimen No.	46513-003
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.

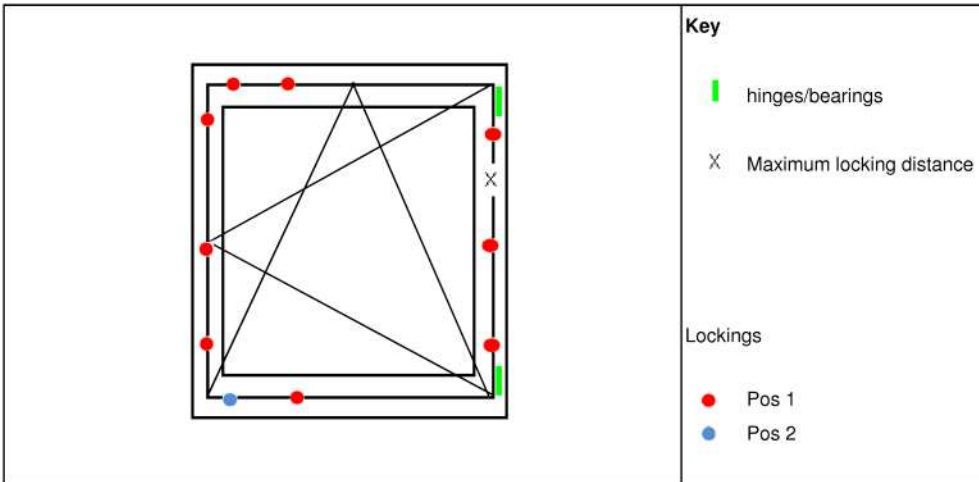
Ambient conditions

Temperature 25 °C Air humidity 53 % Air pressure 966 hPa
The ambient conditions are in accordance with the standard/basis requirements.

Testing of air permeability, watertightness, resistance to wind load, operating forces

Measurement data/Results

Closing condition closed and locked



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

The deflection was not measured because, due to the perimeter locking and the existing locking distance at the existing specimen, the loads are directly conducted into the frame and no deformation of the frame members > l/300 is likely to occur at the specified wind loads.

The test specimen was exposed to a load ± 2000 Pa as specified by EN 12211.

Dynamic wind loads (negative / positive pressures)

Table: pressure pulses

p ₂ in Pa	200	400	600	800	1000
passed					✓

50 cycles at p₂ ± 1000 Pa

Malfunctions at test specimen

At the test specimen were no malfunctions detected.



Testing of air permeability, watertightness, resistance to wind load, operating forces

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

Project-No. 18-002246-PR03
 Basis EN 1026:2016-03
 Windows and doors - Air permeability - Test method
 Test equipment Pst/020920 - Window and facade test rig
 Test specimen Tilt and turn window
 Test specimen No. 46513-003
 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 25 °C Air humidity 53 % Atmospheric pressure 966 hPa
 The ambient conditions are in accordance with the standard/basis requirements.

Measurement data/Results

Closing condition closed and locked
 Size of window frame 1050 mm x 1550 mm
 Size of active casement 1000 mm x 1500 mm
 Area of test specimen 1,63 m²
 Length of opening joints 5,00 m

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.

Test Report

No. 18-002246-PR03 (PB-A01-0203-en-01) dated 23.08.2018
Owner (client) Salamander Industrie-Produkte GmbH, 86842 Türkheim (Germany)

Testing of air permeability, watertightness, resistance to wind load, operating forces



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

Project-No. 18-002246-PR03
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 Tilt and turn window
Test specimen No. 46513-003
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 25 °C Air humidity 53 % Atmospheric pressure 966 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 ₃	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.



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
23.08.2018

A handwritten signature in blue ink, appearing to read 'M. Breckl-Stock'.

Michael Breckl-Stock
Deputy Head of Testing Department
Building Component Testing

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

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

Test Report

no. 18-002246-PR03 (PB-A01-0203-en-01) dated 23.08.2018
 owner (client) Salamander Industrie-Produkte GmbH, 86842 Türkheim (Germany)



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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.: 46513-003

ID of goods received :

ift Mitarbeiter: kl

ift staff member :

Eigenschaft Characteristic	Angaben des Auftraggebers (unverändert) Information provided by client (unchanged)
Produkt Product	*Drehkipfenster Tilt and turn window
Hersteller Manufacturer	*Fa. Salamander Industrie- Produkte GmbH
Bezeichnung Designation	*Streamline 60
Profilsystem Profile system	*Streamline 60
Öffnungsart, Öffnungsrichtung Type of opening, opening direction	*Drehkip, DIN rechts, nach innen öffnend Tilt and turn, DIN right inward opening
Rahmenmaterial Frame material	*PVC/U weiß uPVC white
Blendrahmenaußenmaß (B x H) Overall frame dimensions (W x H)	*1050 mm x 1550 mm
Flügelaußenmaß (B x H) Overall casement dimensions (W x H)	*1000 mm x 1500 mm
Blendrahmen Frame member	
Bezeichnung / Typ / Art.-Nr. Designation / type / item no.	*240 020 mit Verstärkungsprofil 445 020 (Stahl verzinkt), näheres siehe Zeichnungen __ with reinforcing profile __, further details are given in drawings
Rahmenverbindung Frame joint	*Auf Gehrung geschnitten und verschweißt Mitred and welded
Flügelrahmen Casement member	

Test Report

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Eigenschaft Characteristic	Angaben des Auftraggebers (unverändert) Information provided by client (unchanged)
Bezeichnung / Typ / Art.-Nr. Designation / type / item no.	*241 020 mit Verstärkungsprofil 445 230 (Stahl verzinkt), näheres siehe Zeichnungen (e.g. __ with reinforcing profile __, further details are given in drawings)
Eckausbildung Corner design	*Auf Gehrung geschnitten und verschweißt Mitre and welded
Flügelgewicht (in kg) Casement weight (in kg)	*36,5kg
Falzausbildung Rebate design	
Entwässerung Drainage	*Im Falz: 2 Schlitz 4 mm x 30 mm, nach außen: 2 Schlitz 4 mm x 30 mm, ohne Abdeckkappen Inside rebate: __ slots of __ mm x __ mm, to outside front: __ slots __ mm x __ mm, without cover caps
Druckausgleich Pressure equalisation	*Außendichtung oben mittig um 100 mm ausgeklinkt External rebate seal, __ mm notched at top centre
Falzdichtung außen External rebate seal	
Hersteller / Lieferant Manufacturer / supplier	Fa. Salamander Industrie- Produkte GmbH
Bezeichnung / Typ / Art.-Nr. Designation / type / item no.	*Anschlagdichtung 414 025
Material Material	*EPDM EPDM
Eckausbildung Corner design	*Umlaufend, oben mittig stumpf gestoßen und verklebt Continuous, at top centre butt-jointed and bonded
Falzdichtung innen Internal rebate seal	
Hersteller / Lieferant Manufacturer / supplier	Fa. Salamander Industrie- Produkte GmbH
Bezeichnung / Typ / Art.-Nr. Designation / type / item no.	*Anschlagdichtung 414 025
Material Material	*EPDM EPDM
Eckausbildung Corner design	*Umlaufend, oben mittig stumpf gestoßen und verklebt Continuous, at top centre butt-jointed and bonded
Füllung Infill panel	Floatglas
Glasaufbau Glass configuration	* - -
Gesamtdicke Total thickness	*8 mm
Einbau der Füllungen Installation of infill panels	1
Dampfdruckausgleich Belüftung Entwässerung	*Im Glasfalz Unten und oben: 2 Schlitz 4 mm x 30 mm Each casement at bottom and top: __ slots __ mm __ mm In den Falz Unten und oben: 2 Schlitz 4 mm x 30 mm Each casement at bottom and top: __ slots __ mm __ mm

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 owner (client) Salamander Industrie-Produkte GmbH, 86842 Türkheim (Germany)



Eigenschaft Characteristic	Angaben des Auftraggebers (unverändert) Information provided by client (unchanged)
Verglasungsdichtung außen External glazing gasket	
Hersteller / Lieferant Manufacturer / supplier	Fa. Salamander Industrie- Produkte GmbH
Bezeichnung / Typ / Art.-Nr. Designation / type / item no.	*Verglasungsdichtung 414 573
Material Material	*EPDM EPDM
Eckausbildung Corner design	*Umlaufend, oben mittig stumpf gestoßen und verklebt Continuous, at top centre butt-jointed and bonded
Verglasungsdichtung innen Internal glazing gasket	
Hersteller / Lieferant Manufacturer / supplier	Fa. Salamander Industrie- Produkte GmbH
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
Glashalteleiste Glazing bead	
Typ Type	*Glasleiste 413 833
Eckausbildung Corner design	*auf Gehrung geschnitten und gestoßen Mitred and jointed
Befestigung Fixing method/fasteners	*geklemmt Clamped
Beschlag Hardware	
Hersteller Manufacturer	*Roto Frank AG
Typ Type	*Drehkipp-Beschlag Tilt and turn hardware
Lager Bearings	*Scherenlager Tilt mechanism pivot Ecklager Corner pivot
Anzahl Verriegelungen (wo vorhanden): Number of locking devices (where appropriate):	
Unten At bottom	*2
Oben At top	*2
Bandseitig On hinge side	*3

Test Report

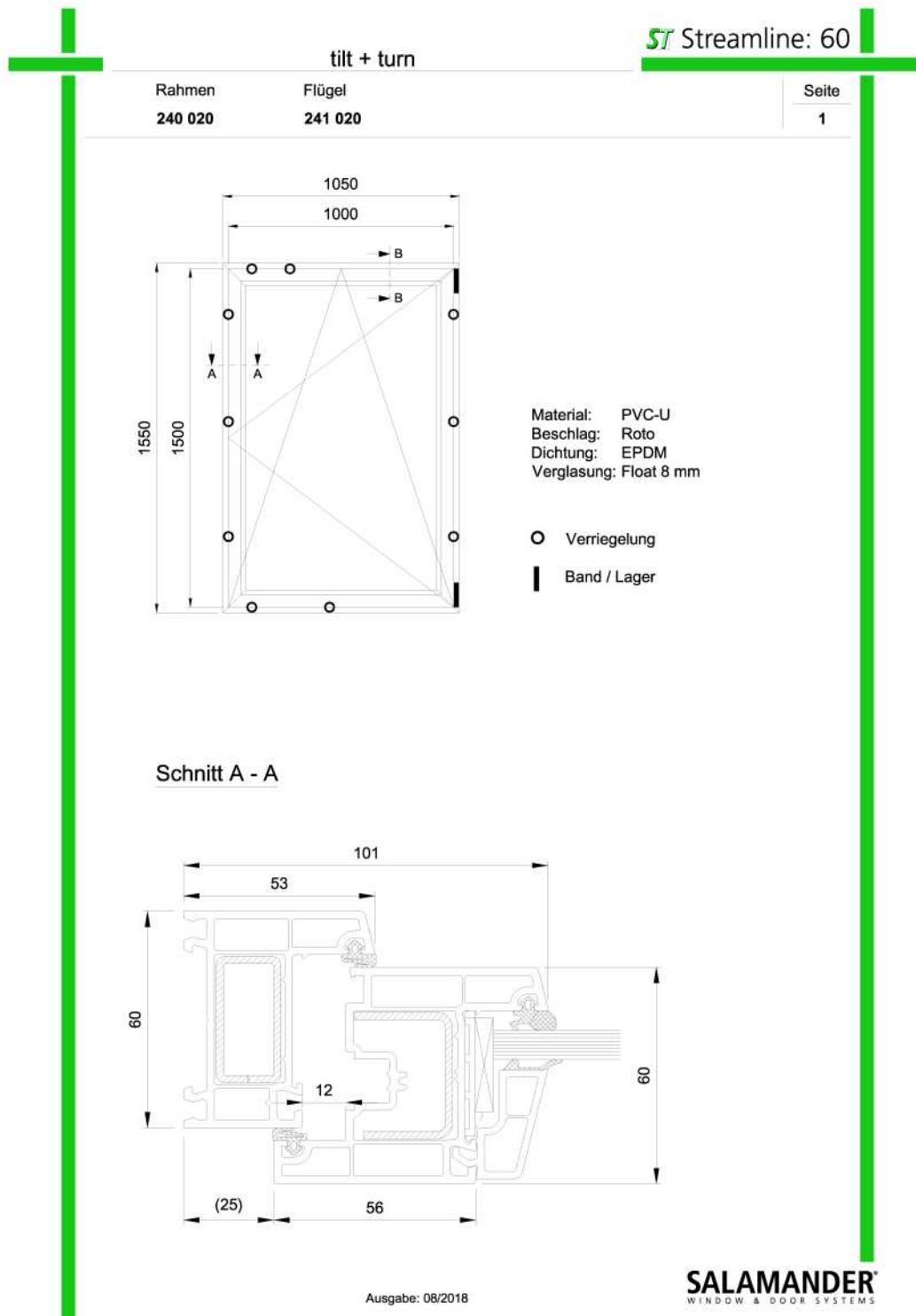
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Eigenschaft Characteristic	Angaben des Auftraggebers (unverändert) Information provided by client (unchanged)
Schließseitig On lock side	*3
Max. Verriegelungs- abstand Max. locking distance	*600 mm
Stellung der Verriegelung Position of locking device	*Neutral Neutral
Befestigung des Probekörpers am Montagerahmen / an die Tragkonstruktion Fixing of test specimen to sub- frame / supporting construction	
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	*14
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

Test Report

no. 18-002246-PR03 (PB-A01-0203-en-01) dated 23.08.2018
 owner (client) Salamander Industrie-Produkte GmbH, 86842 Türkheim (Germany)

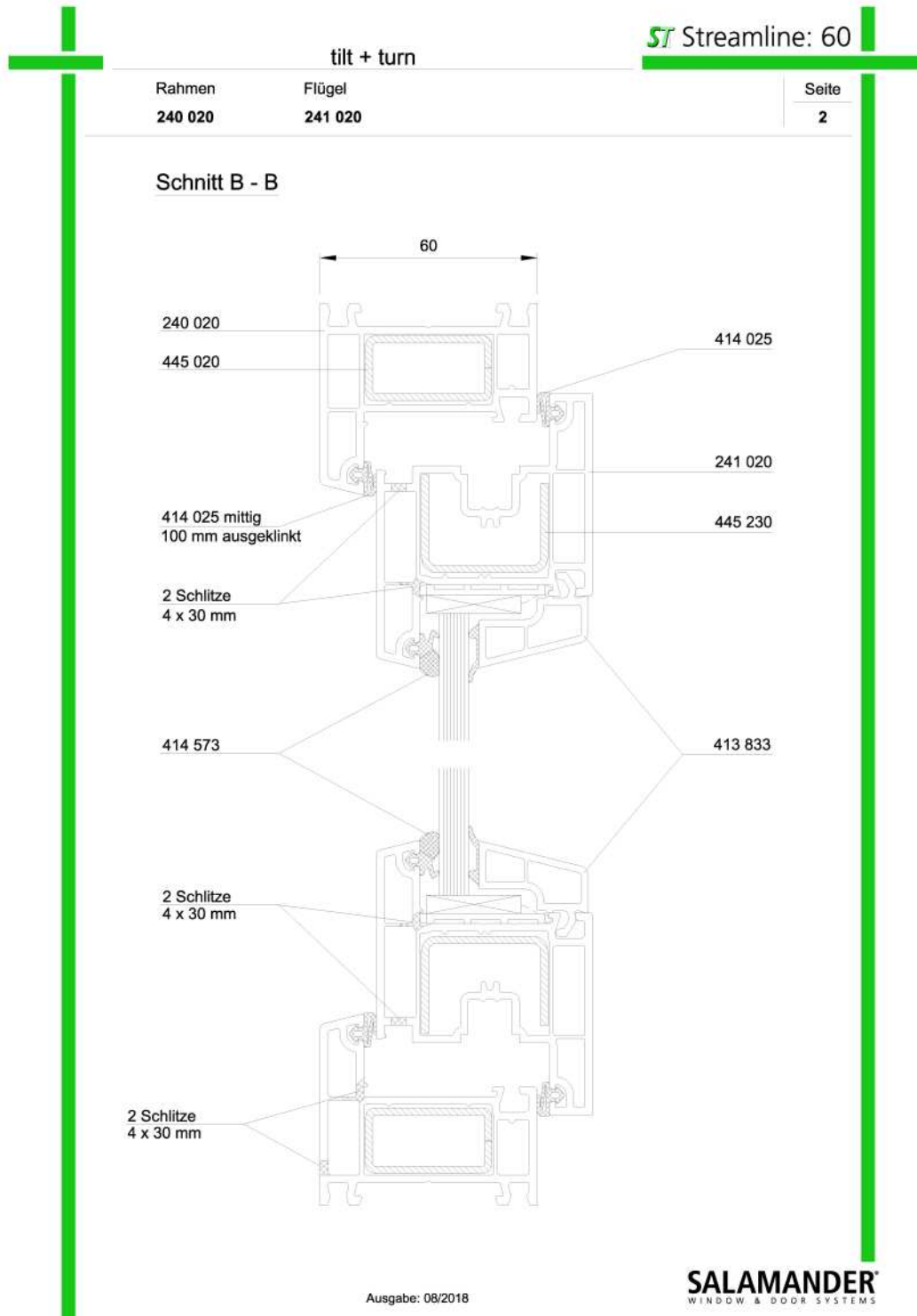


Picture 1 View and horizontal section

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Picture 2

Vertical section

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Picture 1 View of test specimen



Picture 2 rebate seal, external



Picture 3 rebate seal, internal



Picture 4 Tilt mechanism pivot, seen from rebate, frame



Picture 5 Tilt mechanism pivot, seen from rebate, casement



Picture 6 Tilt mechanism pivot, seen from inside



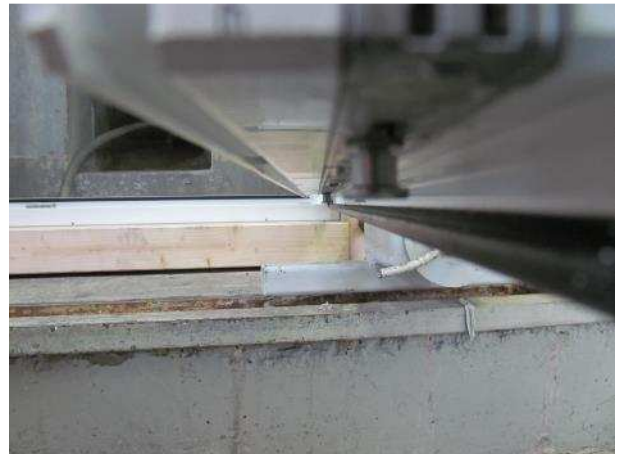
Picture 7 Corner pivot, seen from rebate, frame



Picture 8 Corner pivot, seen from inside



Picture 9 seen from rebate, frame



Picture 10 seen from rebate, casement



Picture 11 Locking situation, frame 1



Picture 12 Locking situation, casement 1



Picture 13 Locking situation, frame 2



Picture 14 Locking situation, casement 2



Picture 15 Fixing of the glazing internal



Picture 16 Fixing of the glazing external



Picture 17 Drainage, seen from rebate



Picture 18 Drainage, seen from outside