Evidence of Performance

Air permeability, Watertightness, Resistance to wind load

Test Report
No.15-003962-PR01

(PB-A01-02-en-01)

Client	WINDOW PLUS d.o.o. Karadordeva 150 22300 Stara Pazova Serbia
Product	Tilt and turn window
Designation	System designation: *)
Performance-relevant product details	Material: PVC-U/white
Overall dimensions (W x H)	1230 mm x 1480 mm
Special features	*) According to information given by the manufacturer the used profiles are taken from VEKA, VEKA Softline 82MD. A sampling report dated December 2015 has been submitted to the ift Rosenheim.

Results

Air permeability according to EN 12207:1999-11

Class 4

Watertightness according to EN 12208:1999-11

Class 7A

Resistance to wind load
according to EN 12210:1999-11/AC:2002-08

Class C4 / B4

ift Rosenheim
18.01.2016

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Basis

EN 14351-1:2006+A1:2010

Test standard/s:
EN 1026:2000-06
EN 1027:2000-06
EN 12211:2000-06
Correspond/s to the national standard/s (e.g. DIN EN)

Representation

Instructions for use

The results obtained can be used by the manufacturer for preparing the Declaration of Performance in accordance with the Construction Products Regulation 305/2011/EU. The provisions of the applicable product standard have to be observed.

Validity

The data and results refer solely to the tested and described specimen. Classification remains valid as long as the product and the above basis remain unchanged. The results can be extrapolated under the manufacturer's own liability subject to observance of the relevant specifications set out by the applicable product standard. This test/evaluation does not allow any statement to be made on any further characteristics regarding performance and quality of the construction presented; in particular the effects of weathering and ageing were not taken into account.

Notes on publication

The **ift**-Guidance Sheet "Advertising with ift test documents" applies. The cover sheet can be used as an abstract.

The report contains a total of 20 pages.

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1. Object

1.1 Description of test specimen

Product	Tilt and trun window
Manufacturer	WINDWO PLUS d.o.o.
Date of manufacture	18.12.2015
Profile system	VEKA Softline 82MD
Type of opening / Opening direction	Tilt and turn, DIN right inward opening
Frame material	PVC-U/white
Frame member size (W x H)	1230 mm x 1480 mm
Casement member size (W x H)	1150 mm x 1401 mm
Casement weight	55,8 kg
Frame member	101.295, with reinforcement profile 113.025, further details are given in drawings
Frame joints	mitre-cut and welded
Casement member	103.340, with reinforcement profile 113.363, further details are given in drawings
Casement joints	mitre-cut and welded
Additional profile	Glazing bar, 107.264
Frame joints	mitre-cut, clipped
Rebate design	
Rebate drainage	2 slots of 6 x 36 mm inside rebate, 60 mm from internal edge of frame member, to outside front 2 slots 6 x 36 mm, 210 mm from the external edge of frame member
Rebate seals	
External	
Material	PVC-P, coextruded
Manufacturer	VEKA AG
Corner configuration	mitre-cut and welded
Centre	
PVC-P, coextruded	PVC-P, coextruded
VEKA AG	VEKA AG
mitre-cut and welded	mitre-cut and welded
Internal	
PVC-P, coextruded	PVC-P, coextruded
VEKA AG	VEKA AG
mitre-cut and welded	mitre-cut and welded
Pressure equalization	top horizontal 2 slots of 6 mm x 36 mm inside rebate, 60 mm from the internal edge of frame member, to outside front 2 drills Ø 5 mm
Infill	Insulating glass unit, configuration 4 Low-E / 16 argon / 4 / 16 argon / 4 Low-E

Installation of infills

Glazing gasket

External

Material	PVC-P, coextruded
Manufacturer	VEKA AG
Corner configuration	mitre-cut and welded

Internal

Material	PVC-P, coextruded
Manufacturer	VEKA AG
Corner configuration	mitre-cut with glazing bead 107.264
Vapour pressure equalization	at bottom and at top 2 slots 6 x 36 mm, 185 and 190 mm from the external edge of casement member

Hardware

Type / Producer	tilt and turn hardware, ROTO NT
Hinges / Bearings	1 tilt mechanism pivot, 1 corner pivot
Number of lockings (Broj točaka zaključavanja)	at bottom 2, at top 2, on hinge side 2; lock side 1
Max. locking distance	740 mm
Position of locking	neutral

The description is based on information provided by the client and inspection of the test specimen at the **ift** (item designations / numbers as well as material specifications were provided by the client unless stated *"**ift**-checked"*).

Test specimen representations are documented in the Annex "Representation of product/test specimen". The design details were examined solely on the basis of the characteristics / performance to be classified. The drawings are based on unchanged documentation provided by the client unless stated otherwise. The photographs were taken by the ift Rosenheim unless stated otherwise.

1.2 Sampling

The below sampling data were provided to the ift:

Sampling by:	WINDOW PLUS d.o.o., 22300 Stara Pazova (Serbia)
Date:	18.12.2015
Verification:	A sampling report has been provided to the **ift**.
ift-Pk-Number:	15-003962-PK01 / WE: 40622-001

2. Procedure

2.1 Basis*) referring to methods

Testing

EN 1026:2000-06
Windows and doors - Air permeability - Test method
EN 1027:2000-06
Windows and doors - Watertightness - Test method
EN 12211:2000-06
Windows and doors - Resistance to wind load - Test method

Classification / Evaluation

EN 12207:1999-11
Windows and doors - Air permeability - Classification
EN 12208:1999-11
Windows and doors - Watertightness - Classification
EN 12210:1999-11/AC:2002-08
Windows and doors - Resistance to wind load - Classification

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

2.2 Brief description of procedure

Air permeability - EN 1026

Air permeability is tested in accordance with EN 1026 and conducted in steps at negative pressure and positive pressure up to the maximum test pressure difference. Leakages of the test set-up are made visible using artificially generated fog and sealed using permanently resilient sealant. The test specimen is exposed to three pressure pulses Δp_{max} + 10 % or at least 500 Pa. This is followed by measurement of air permeability for the respective pressure steps.

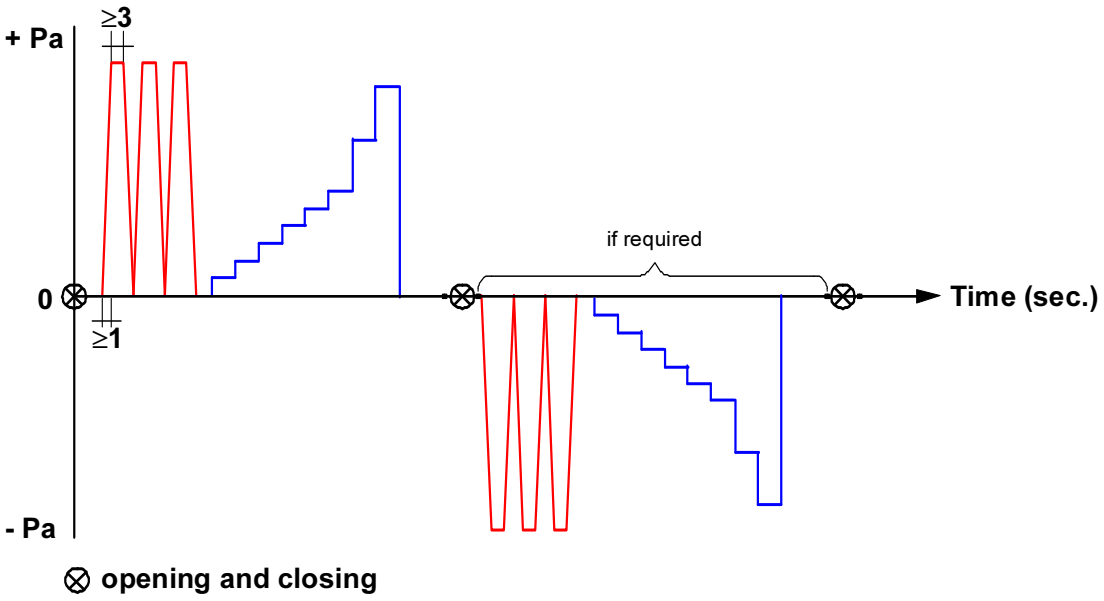


Illustration Test sequence for air permeability

Resistance to wind load - Deflection and alternating negative/positive pressures - EN 12211

Resistance to wind load is tested in accordance with EN 12211 and conducted in steps at negative pressure and positive pressure up to the test pressure p_1. The test specimen is exposed to three pressure pulses Δp_1 + 10 %. This is 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 Δp_1. Then the test specimen is subjected to 50 cycles including negative and positive pressures of $\pm \Delta p_2 = \Delta p_1$ - 50 %.

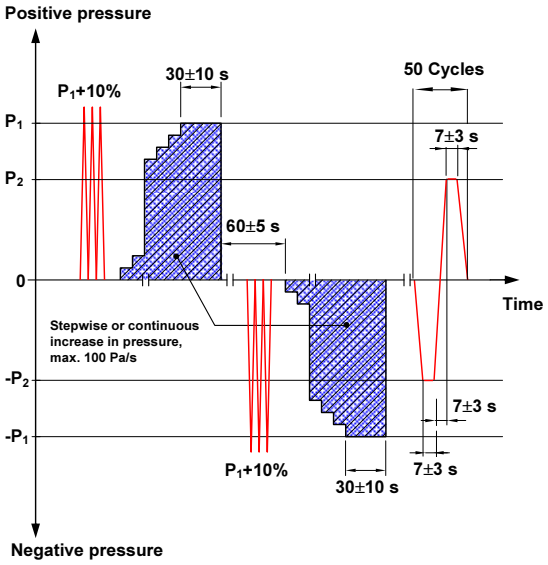


Illustration Test sequence for resistance to wind load

Air permeability – Repeat test - EN 1026

Following resistance to wind load test for p_1 (deflection) and p_2 (alternating positive/negative pressure), air permeability must not exceed by more than 20% the upper limit of the specified class as set out by EN 12207.

Watertightness - EN 1027

Watertightness is tested in accordance with EN 1027 up to the maximum test pressure difference. The external face of the test specimen is subjected to constant spraying of water by an upper row of nozzles at a flow rate of approx. 2 l/min per nozzle while increments of positive test pressure are applied at regular intervals. For test specimen exceeding 2.50 m in overall height, additional rows of nozzles are fixed at vertical intervals at 1.5 m below the top nozzle line. The water flow rate of the additional nozzle rows is approx. 1 l/min per nozzle.

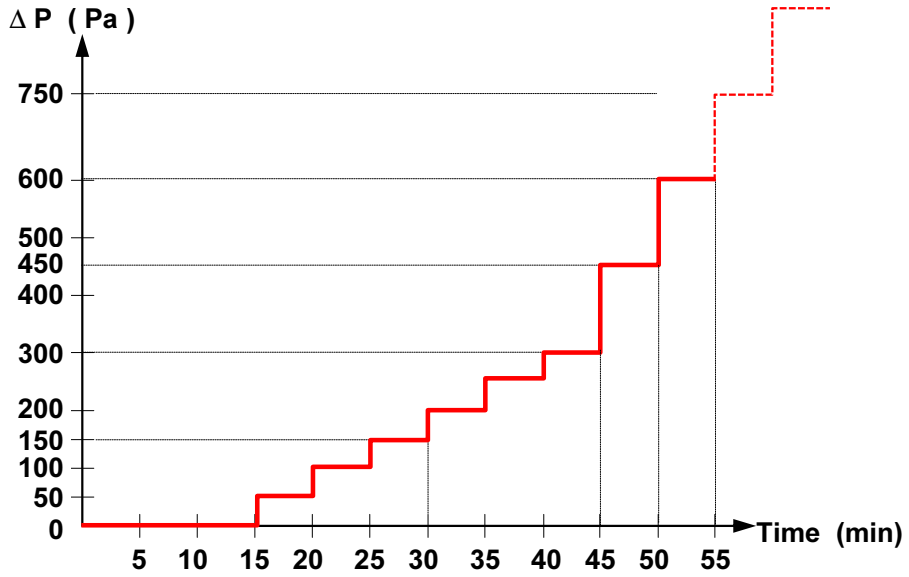


Illustration Test sequence for watertightness

Resistance to wind load – Safety test - EN 12211

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

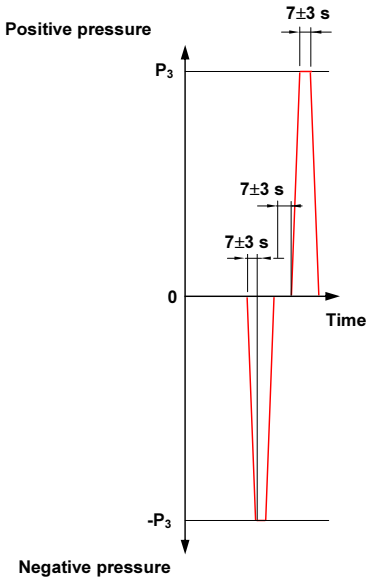


Illustration Test sequence for safety test

3. Detailed results

Air permeability - Test according to EN 1026

Project-No.	15-003962-PR01	**Task No.**	15-003962
Client	WINDOW PLUS d.o.o., Karađorđeva 150, 22300 Stara Pazova, Serbia		
Basis of test	EN 1026:2000-06 Windows and doors - Air permeability - Test method		
Used test equipment	EPst/026026 - LWW Prüfstand - euroinspekt-drvokontrola d.o.o, - Zagreb		
Test specimen	Tilt and turn window		
Test specimen No.	40622-001		
Date of test	22. Dezember 2015		
Responsible test engineer	Graf Andreas		
Tester	Mario Šimunović		

Information to test assembly and testing method

Testing method	There were no deviations from test method or test conditions.

Testing procedure

Size of window frame	1230 mm	x	1480 mm
Size of leaf	1150 mm	x	1401 mm

Area of test specimen	1,82 m²
Length of opening joints	5,10 m

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

Table: Air permeability at positive wind pressure

Measured results at positive wind pressure	**Pressure differential in Pa**		**50**	**100**	**150**	**200**	**250**	**300**	**450**	**600**
	Flow rate (volume)	m³/h	0,71	1,17	1,47	1,75	2,02	2,27	3,47	4,52
	Joint lenght-related	m³/hm	0,14	0,23	0,29	0,34	0,40	0,44	0,68	0,89
	Overall area-related	m³/hm²	0,39	0,64	0,81	0,96	1,11	1,25	1,91	2,48

Table: Air permeability at negative wind pressure

Measured results at negative wind pressure	**Pressure differential in Pa**		**50**	**100**	**150**	**200**	**250**	**300**	**450**	**600**
	Flow rate (volume)	m³/h	0,69	1,18	1,54	1,88	2,14	2,37	3,02	3,69
	Joint lenght-related	m³/hm	0,14	0,23	0,30	0,37	0,42	0,46	0,59	0,72
	Overall area-related	m³/hm²	0,38	0,65	0,85	1,03	1,18	1,30	1,66	2,03

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

Average value from positive and negative wind pressures	**Pressure differential in Pa**		**50**	**100**	**150**	**200**	**250**	**300**	**450**	**600**
	Flow rate (volume)	m³/h	0,7	1,2	1,5	1,8	2,1	2,3	3,2	4,1
	Joint lenght-related	m³/hm	0,14	0,23	0,29	0,36	0,41	0,45	0,64	0,80
	Overall area-related	m³/hm²	0,38	0,65	0,83	1,00	1,14	1,27	1,78	2,25

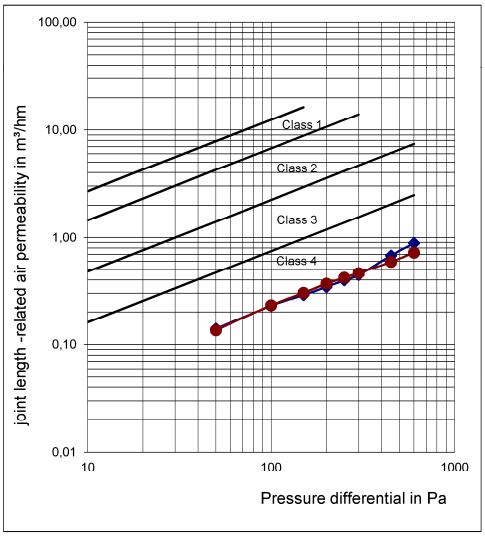


Diagram: Joint length-related air permeability (positive and negative wind pressures)

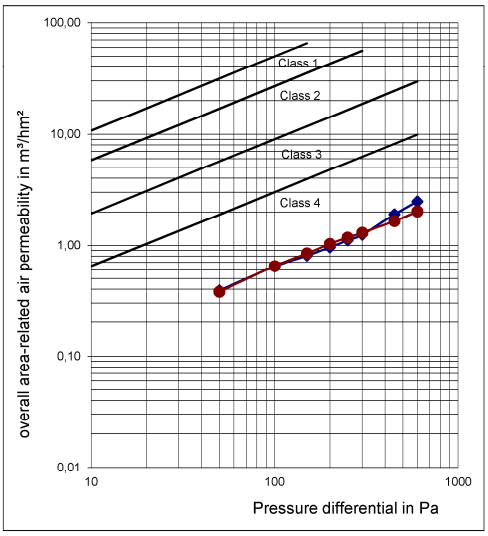


Diagram: Overall area-related air permeability (positive and negative wind pressures)

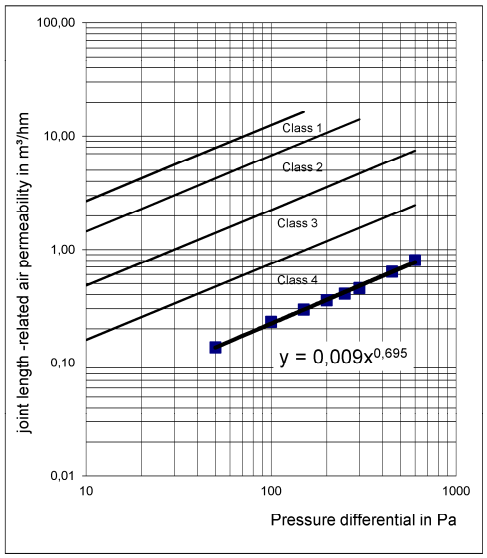


Diagram: Joint length-related air permeability (average value from positive and negative wind pressures)

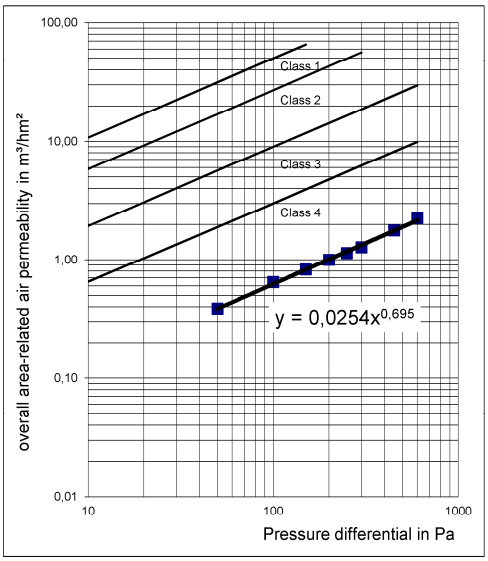


Diagram: Overall area-related air permeability (average value from positive and negative wind pressures)

Table: Measured results

Reference air permeability related to joint length	Q100 =	0,22	m³/hm
Reference air permeability related to overall area	Q100 =	0,62	m³/hm²

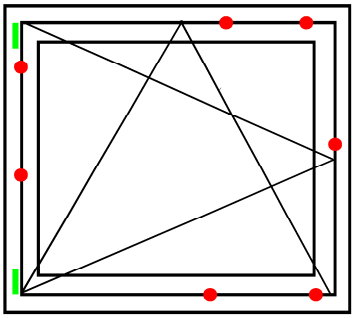
Resistance to wind load, deflection and dynamic wind load - Test according to EN 12211

Project-No.	15-003962-PR01	**Task No.**	15-003962
Client	WINDOW PLUS d.o.o., Karađorđeva 150, 22300 Stara Pazova, Serbia		
Basis of test	EN 12211:2000-06 Windows and doors - Resistance to wind load - Test method		
Used test equipment	EPst/026026 - LWW Prüfstand - euroinspekt-drvokontrola d.o.o, - Zagreb		
Test specimen	Tilt and turn window		
Test specimen No.	40622-001		
Date of test	22. Dezember 2015		
Responsible test engineer	Graf Andreas		
Tester	Mario Šimunović		

Information to test configuration / Test method

Test method	There were no deviations from test method or test conditions.

Testing procedure



Key

- hinges/bearings
- locks
- X Maximum locking distance

Maximum test pressure: ± 1600 Pa 3 pressure pulses of 1760 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 ± 1600 Pa as specified by EN 12211.

Dynamic wind loads (negative / positive pressures)

Table: pressure pulses

p_2	Pa	200	400	600	800	1000
passed					✓	

50 Zcycles at p_2 ± 800 Pa

No malfunctions were detected.

Repeat test of air permeability - Test according to EN 1026

Project-No.	15-003962-PR01	**Task No.**	15-003962
Client	WINDOW PLUS d.o.o., Karađorđeva 150, 22300 Stara Pazova, Serbia		
Basis of test	EN 1026:2000-06 Windows and doors - Air permeability - Test method		
Used test equipment	EPst/026026 - LWW Prüfstand - euroinspekt-drvokontrola d.o.o, - Zagreb		
Test specimen	Tilt and turn window		
Test specimen No.	40622-001		
Date of test	22. Dezember 2015		
Responsible test engineer	Graf Andreas		
Tester	Mario Šimunović		

Information to test configutation / Test method

Test method	There were no deviations from test method or test conditions.

Testing procedure

Size of window frame	1230 mm	x	1480 mm
Size of leaf	1150 mm	x	1401 mm
Area of test specimen	1,82 m²		
Length of opening	5,10 m		

Subsequent to the test of resistance of wind load by application of test pressure 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.

Watertightness - Test according to EN 1027

Project-No.	15-003962-PR01	**Task No.**	15-003962
Client	WINDOW PLUS d.o.o., Karađorđeva 150, 22300 Stara Pazova, Serbia		
Basis of test	EN 1027:2000-06 Windows and doors - Watertightness - Test method		
Used test equipment	EPst/026026 - LWW Prüfstand - euroinspekt-drvokontrola d.o.o, - Zagreb		
Test specimen	Tilt and turn window		
Test specimen No.	40622-001		
Date of test	22. Dezember 2015		
Responsible test engineer	Graf Andreas		
Tester	Mario Šimunović		

Information to test assembly and testing method

Testing method	There were no deviations from test method or test conditions.

Testing procedure

Size of window frame 1230 mm x 1480 mm

Number of spray nozzles	3	Lower nozzle line	
Water amount	360 l/h	Water amount	0 l/h
	0,36 m³/h		0 m³/h

Spray method A

No water penetration at up to 300 Pa detected.

Resistance to wind load, Safety test - Test according to EN 12211

Project-No.	15-003962-PR01	**Task No.**	15-003962
Client	WINDOW PLUS d.o.o., Karađorđeva 150, 22300 Stara Pazova, Serbia		
Basis of test	EN 12211:2000-06 Windows and doors - Resistance to wind load - Test method		
Used test equipment	EPst/026026 - LWW Prüfstand - euroinspekt-drvokontrola d.o.o, - Zagreb		
Test specimen	Tilt and turn window		
Test specimen No.	40622-001		
Date of test	22. Dezember 2015		
Responsible test engineer	Graf Andreas		
Tester	Mario Šimunović		

Information to test assembly and testing method

Testing method	There were no deviations from test method or test conditions.

Safety test

Table: Pressure steps

		Positive wind pressure					Negative wind pressure				
p_3	Pa	600	1200	1800	2400	3000	-600	-1200	-1800	-2400	-3000
passed					✓					✓	

Safety test passed at up to p_3 ± 2400 Pa.

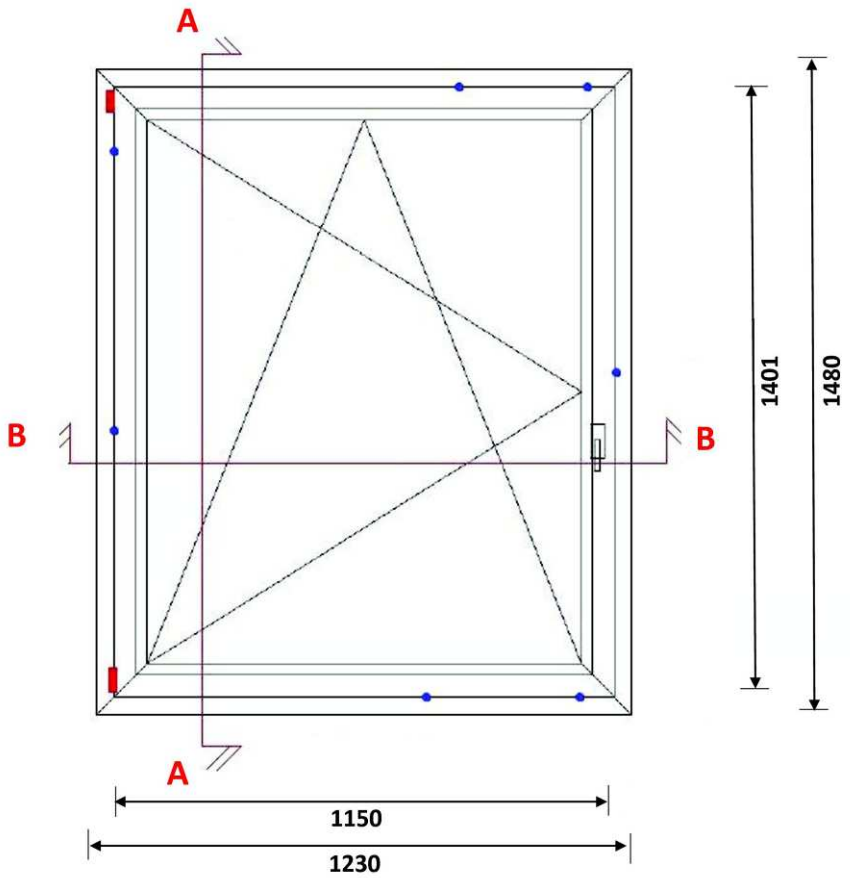
WINDOW PLUS

VEKA Softline 82MD

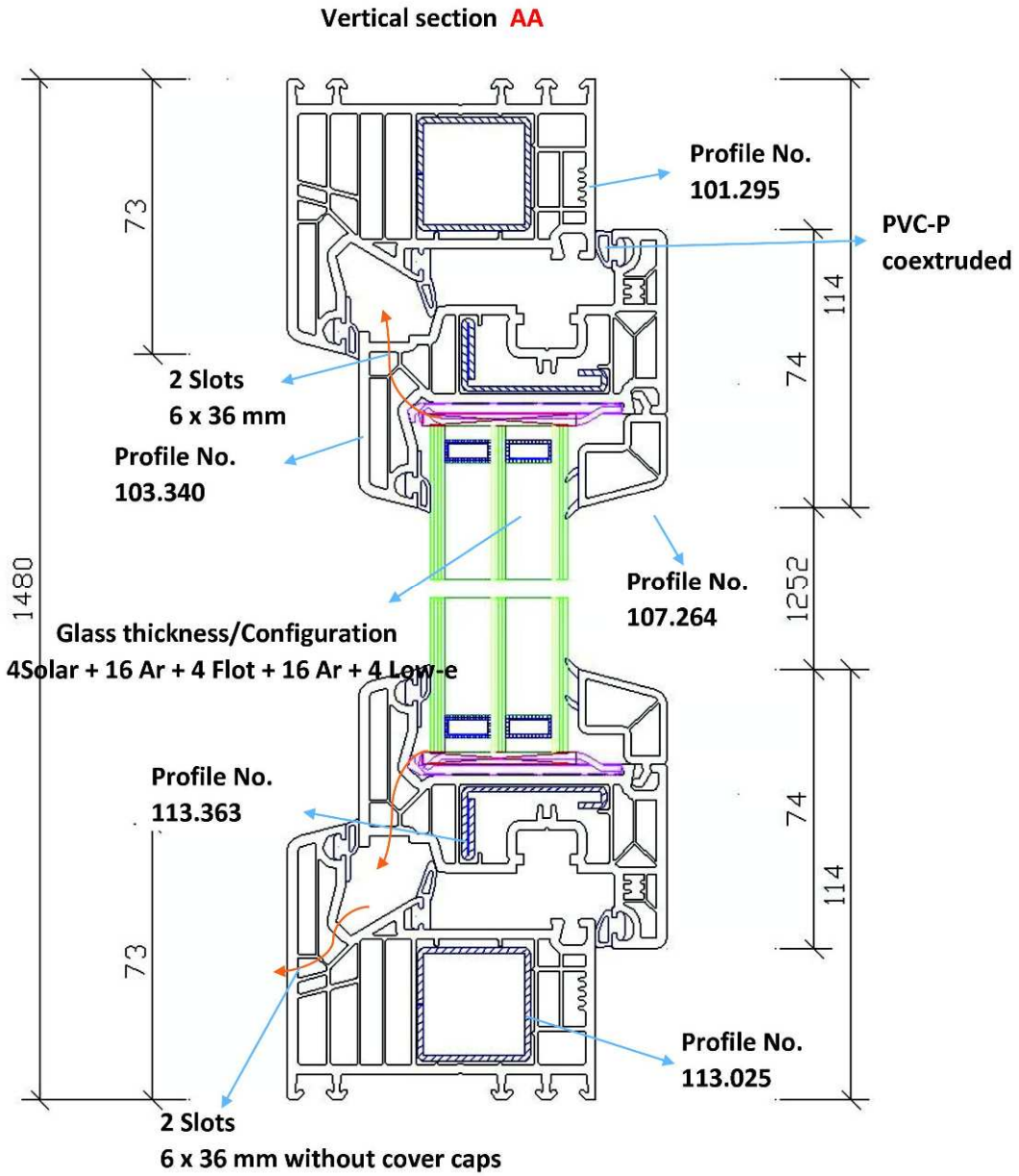
Hinges

Lockings

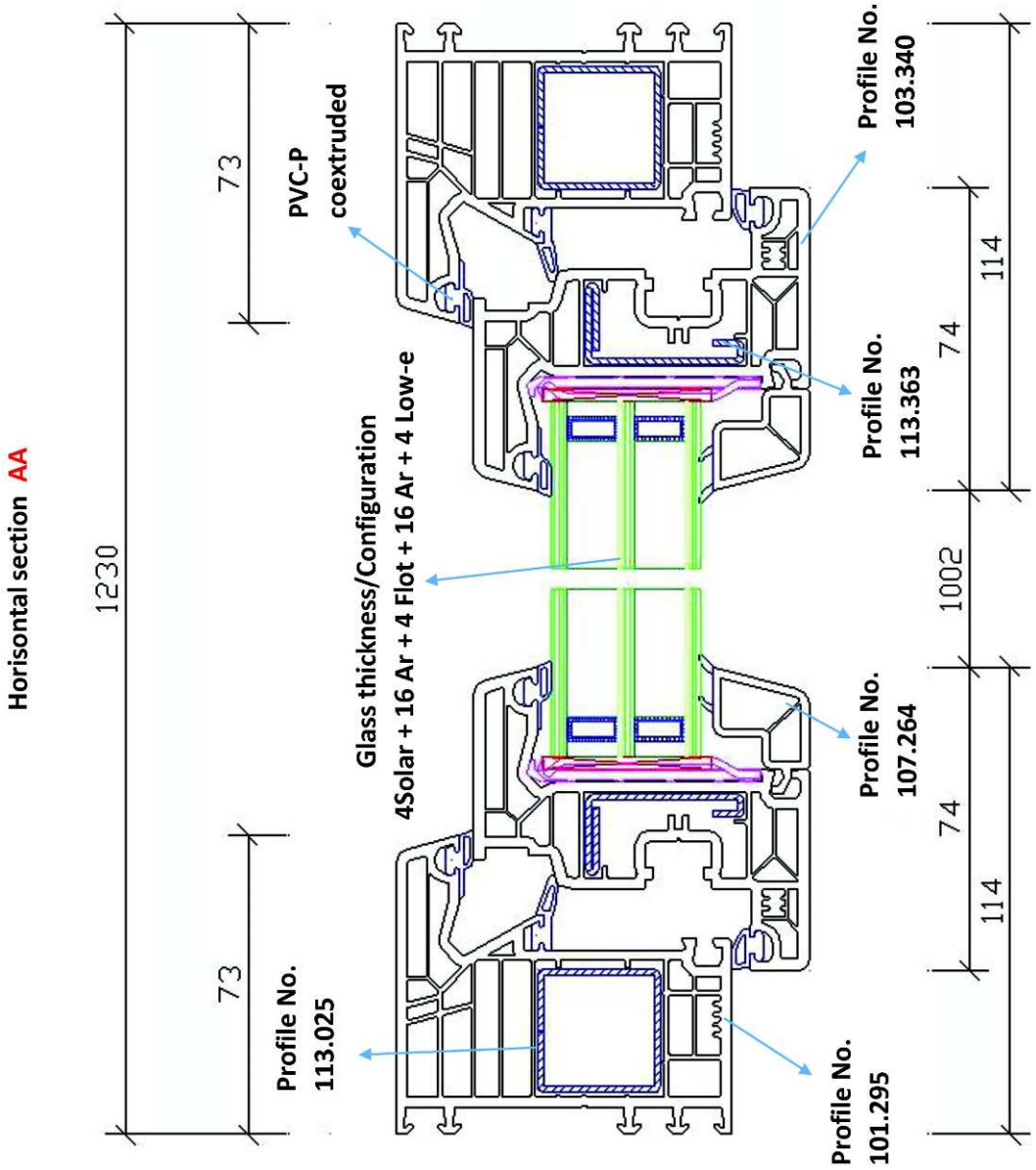
Hardware: ROTO NT



Drawing 1
Test specimen



Drawing 2
Vertical section



Drawing 3
Horizontal section

Fig. 1
Test specimen on test rig
window closed

Fig. 2
External rebate seal, corner design

Fig. 3
Middle gasket, corner design

Fig. 4
Internal rebate seal, corner design

Fig. 5
Tilt mechanism pivot, rebate view

Fig. 6
Tilt mechanism pivot, internal view

Fig. 7
Corner pivot, rebate view

Fig. 8
Corner pivot, internal view

Fig. 9
Locking situation, frame member / casement member 1

Fig. 10
Locking situation, frame member / casement member 2

Fig. 11
Locking situation, frame member 3

Fig. 12
Locking situation, casement member 3