## Evidence of Performance

Air permeability, Watertightness, Resistance to wind load

Test Report No. 12-003023-PR04 (PB-A01-02-en-01)

Client

Arbor Ahsap Yapi Elemanlari Atatürk bulvari Köstemir yolu No:74 Silivri Istanbul Turkey

Product	Tilt and turn window
Designation	System designation: MINIMA 68mm
Performance-relevant product details	Material: Wood-Aluminium
Overall dimensions (W x H)	1,230 mm x 1,480 mm
Special features	

### Results

Air permeability according to EN 12207:1999-11



Class 4

Watertightness according to EN 12208:1999-11



Class E1200

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



Class C3 / B3

ift Rosenheim 07.02.2013

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Basis EN 14351-1:2006+A1:2010

Test standard/s: EN 1026:2000-06 EN 1027:2000-06 EN 12046-1:2003-11 EN 12211:2000-06 EN 14609:2004-06 Correspond/s to the national standard/s (e.g. DIN EN)

#### Representation



structions for use

The results obtained can be used by the manufacturer as the basis for the manufacturer ITT test report summary. Observe the specifications set out by the applicable product standard.

#### 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 19 pages.



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## 1. Object

## 1.1 Description of test specimen

Product	Tilt and turn window
Manufacturer	Selectron Elektrokimya San.Ve Tic. Ltd Şti. (Arbor Wood Windows)
Date of manufacture	January 2013
System	MINIMA 68m
Type of opening / Opening direc- tions	Tilt and turn, DIN right inward opening
Frame material	Wood with aluminium cover profile
Overall frame dimensions (W x H)	1,230 mm x 1,480 mm
Overall casement dimensions (W x H)	1,142 mm x 1,387 mm
	43.5 kg
Frame member	68/70, further details are given in drawings
Frame joint	Tenon and mortice joints
Additional profile /	Aluminium cover profile, Uniform LA 882, aluminium, clipped on
Frame joint	plastic items Uniform LC62, mitred, from inside welded
	68/70, further details are given in drawings
Frame joint	Tenon and mortice joints
Additional profile /	Glazing bar Uniform LP212, screwed on casement
Frame joint	wood glazing bar 20/18, inside
Rabate design	
Rebate drainage	6 slots of 5 mm x 30 mm inside rebate, to outside 6 slots 5 mm x 30 mm
Rebate seal	
External	
Material	Sealing material – EPDM
Manufacturer	Uniform
Item No.	DE 115
Corner design	On aluminium cover profile LA 882, mitred
Centre	
Material	Sealing material – EPDM
Manufacturer	Uniform
Item No.	DE 126
Corner design	On frame, continuous, notched in corners, at top centre butt- jointed
Material	Sealing material – PE, PU, PP and TPE
Manufacturer	Schlegel
Item No.	Q-Lon 3054
Corner design	On casement, continuous, notched in corners, at top centre butt- jointed
Internal	
Material	Sealing material – PE, PU, PP and TPE
Manufacturer	Schlegel
Item No.	Q-Lon 3053
Corner design	continuous, notched in corners, at top centre butt-jointed
Pressure equalisation	Without pressure equalisation.

### Evidence of Performance

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Infill Installation of infills Glazing gasket	Insulating glass unit, configuration 4 / 16 / 4
External	
Material	Sealing material – EPDM
Manufacturer	Uniform
Item No.	DE 115
Corner design	vulcanized frame
Internal	
Material	Sealing material – EPDM
Manufacturer	Uniform
Item No.	DE 133
Corner design	mitred with wood glazing bead 20/18
Vapour pressure equalisation	at bottom and top 2 slots 5 mm x 12 mm
Hardware	
Type / Manufacturer	Tilt and turn hardware, Multi Trend, Maco
Hinges / Bearings	1 tilt mechanism pivot
	1 corner pivot
Number of locks	at bottom 2, at top 2, on hinge side 2, on lock side 3
Maximum locking distance	760 mm
Position of locks	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:	Selectron Elektrokimya San.Ve Tic. Ltd Şti
Date:	Dezember 2012
Verification:	A sampling report has been provided to the ift
Delivered on:	16.01.2012
ift-Pk-Number:	12-003023-PK04 / 28389/072



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## 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 12046-1:2003-11 Operating forces - Test method - Part 1: Windows EN 12211:2000-06 Windows and doors - Resistance to wind load - Test method EN 14609:2004-06 Windows - Determination of the resistance to static torsion

### **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 EN 14351-1:2006+A1:2010 Windows and doors - Product standard, performance characteristics - Part 1: Windows and external pedestrian doorsets without resistance to fire and/or smoke leakage characteristics

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



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### 2.2 Brief description of procedure

### Air permeability - EN 1026

Prior to testing, the operating forces are determined as per EN 12046-1 for the release / locking operation of the hardware.

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  $\Delta p_{max} + 10$ % or at least 500 Pa. This is followed by measurement of air permeability for the respective pressure steps.



Illustration Test sequence for air permeability



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





Negative pressure

Illustration Test sequence for resistance to wind load



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### 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.





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### Resistance to wind load - Safety test - EN 1211

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

Load-bearing capacity of safety devices - EN 14609

Load-bearing capacity of safety devices is tested in accordance with EN 14609. The safety devices are subjected to individual loads of 350 N in the most unfavourable loading direction for 60 seconds. The load is applied pointwise. In deviation from EN 14609 the load can be applied directly to the safety device so as to test the most unfavourable load application to the stay bearing.



### 3. Detailed results

#### Test record

restrection						
Specimen	Tilt and turn window					
Project No.	12-003023					
Client	Selectron Elektrokimya San.ve	Size of window from	1140		1207	
	Tic.Ltd.Şti.(Arbor Wood Windows)	Size of window frame	1142	x	1307	m
System	MINIMA 68m	Size of casement	1230	x	1480	mm
Frame material	Wood with aluminium cover profile					mn
Date of test	24. January 2013	Area of test specimen	1,6	m²		
Tester	A.Özcelik	Length of opening joints	5,4	m		
Specimen No.	28389-072	Casement weight	43,5	kg		
Date of delivery	16. January 2013	Temperature	21	° C		
Date of manufacture	December 2012	Air humidity	42,5	%		
Attended by:		Air pressure	1005	hPa		



Figure 1 View of specimen

#### 1 Operating forces - Test according to EN 12046

Table: Measurement of operating forces											
Individual measured	1	2	3	Average value							
in Nm	9,5	9,4	9,6	9,5							

#### 2 Air permeability - Test according to EN 1026

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

Measured results at	Pressure differenti	50	100	150	200	250	300	450	600	
positive wind pressure	Flow rate (volume)	m³/h	0,0	0,0	0,3	0,4	0,5	0,6	0,8	1,1
	Joint length-related	m³/hm	*)	*)	*)	*)	0,09	0,11	0,15	0,20
	Overall area-related	m <sup>3</sup> /hm <sup>2</sup>	*)	*)	*)	*)	0,32	0,38	0,52	0,67

\*) The measured values were below the  $0.5m^3/h$  leak flow volume of the displacement transducer. The precision of measurements is  $0.1m^3/h$ .

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

Table: 7 ill politicability at hogative wind procedure										
Measured results at Pressure differential in	n Pa	50	100	150	200	250	300	450	600	
negative wind pressure Flow rate (volume)	m³/h	0,0	0,2	0,3	0,4	0,5	0,6	0,7	0,9	
Joint length-related m	³/hm	*)	*)	*)	*)	0,09	0,10	0,13	0,16	
Overall area-related m <sup>3</sup>	/hm²	*)	*)	*)	*)	0,32	0,35	0,45	0,54	

\*) The measured values were below the 0,5m<sup>3</sup>/h leak flow volume of the displacement transducer. The precision of measurements is 0,1m<sup>3</sup>/h.

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

Average value from	Pressure differential in Pa		50	100	150	200	250	300	450	600
positive and negative	Flow rate (volume)	m³/h	0,0	0,1	0,3	0,4	0,5	0,6	0,8	1,0
wind pressures	Joint length-related	m³/hm	*)	*)	*)	*)	0,09	0,11	0,14	0,18
	Overall area-related	m³/hm²	*)	*)	*)	*)	0,32	0,36	0,48	0,60

#### **Evidence of Performance**

Air permeability, Watertightness, Resistance to wind load Test Report No. 12-003023-PR04 (PB-A01-02-en-01) dated 07. Februar 2013 Client: Arbor Ahsap Yapi Elemanlari, Istanbul, (Turkey)









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

Table: Measured results



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



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

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



#### Resistance to wind load - Test according to EN 12211 3 3.1 Deflection under wind load

Maximum test pressure: ± 1200 Pa 3 pressure pulses of 1320 Pa

Deflection was not measured because due to the perimeter locking and the existing locking distance no deformation of the frame members > I/300 is likely to occur at the specified wind loads. 1200 Pa as specified by EN 12211. The test specimen was exposed to a load  $\pm$ 

#### 3.2 Dynamic wind loads (negative / positive pressures)

Table: Pr	Table: Pressure steps											
p <sub>2</sub>	Pa	200	400	600	800	1000						
passed				✓								

50 cycles at  $p_2\,\pm$ 600 Pa No malfunctions were detected.

#### 4 Repeat test of air permeability - Test according to EN 1026

Subsequent to the test of resistance to wind load by application of test pressures p1 and p2, the upper limit of the achieved air permeability class must not be exceeded by more than 20% as set out by EN 12207 (Clause 2 of this test record).

The requirements were fulfilled.

#### 5 Watertightness - Test according to EN 1027

No water penetration at up to 1350 Pa detected.

#### Resistance to wind load - Test according to EN 12211 - Safety test 3.3

positive wind pressure				ne	egative	wind	pressu	ire			
p <sub>2</sub>	Pa	600	1200	1800	2400	3000	-600	-1200	-1800	-2400	-3000
passed				✓					✓		

1800 Pa passed.

Safety test passed at up to  $p_3 \pm$ 

## Load-bearing capacity of safety devices

The testing of the safety device is carried out with a load of 350N for 60s. No malfunctions were detected at the test specimen.

ift Rosenheim 24. January 2013

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Annex 1: Representation of product/test specimen **Evidence of Performance** Air permeability, Watertightness, Resistance to wind load Test Report No. 12-003023-PR04 (PB-A01-02-en-01) dated 07. Februar 2013 Client: Arbor Ahsap Yapi Elemanlari, Istanbul, (Turkey)



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### Test specimen

Annex 1: Representation of product/test specimen **Evidence of Performance** Air permeability, Watertightness, Resistance to wind load

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Drawing 2 Horizontal section Annex 1: Representation of product/test specimen **Evidence of Performance** Air permeability, Watertightness, Resistance to wind load Test Report No. 12-003023-PR04 (PB-A01-02-en-01) dated 07. Februar 2013 Client: Arbor Ahsap Yapi Elemanlari, Istanbul, (Turkey)



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## DÜŞEY KESİT

Drawing 3 Vertical section

Annex 2: Picture **Evidence of Performance** Air permeability, Watertightness, Resistance to wind load Test Report No. 12-003023-PR04 (PB-A01-02-en-01) dated 07. Februar 2013 Client: Arbor Ahsap Yapi Elemanlari, Istanbul, (Turkey)





Fig. Test specimen on test rig window closed



Rebate drainage, seen from rebate



Fig. Aluminium cover profile, corner design, inside



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Fig. Test specimen on test rig window open



Rebate drainage, to outside



Fig. Aluminium cover profile, corner design, outside

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### Annex 2: Picture **Evidence of Performance** Air permeability, Watertightness, Resistance to wind load Test Report No. 12-003023-PR04 (PB-A01-02-en-01) dated 07. Februar 2013 Client: Arbor Ahsap Yapi Elemanlari, Istanbul, (Turkey)





### Fig.

External rebate seal, on aluminium cover profile



Fig. Centre seal on frame, corner design



Fig. Centre seal on casement, corner design



Centre seal on frame, sealant joint



Fig. Centre seal on casement, sealant joint

### Annex 2: Picture **Evidence of Performance** Air permeability, Watertightness, Resistance to wind load Test Report No. 12-003023-PR04 (PB-A01-02-en-01) dated 07. Februar 2013 Client: Arbor Ahsap Yapi Elemanlari, Istanbul, (Turkey)





Fig.

Internal rebate seal, corner design



Fig.

External rebate seal, pourable sealant, silicone, corner design



Fig. Vapour pressure equalisation



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Fig. Internal rebate seal, sealant joint



Internal rebate seal, pourable sealant, silicone, corner design



Fig. Vapour pressure equalisation

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Fig. Tilt mechanism pivot, seen from inside



Corner pivot, seen from inside



Fig. Locking situation, frame / casement



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Fig. Tilt mechanism pivot, seen from rebate



Corner pivot, seen from rebate



Fig. Locking situation, casement

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### Annex 2: Picture **Evidence of Performance** Air permeability, Watertightness, Resistance to wind load Test Report No. 12-003023-PR04 (PB-A01-02-en-01) dated 07. Februar 2013 Client: Arbor Ahsap Yapi Elemanlari, Istanbul, (Turkey)





Fig. Rocker bearing