CONSTRUCTION ELEMENTS ENGINEERING DEPARTMENT
BUILDING ELEMENTS LABORATORY

REPORT OF THE TESTS AND ASSESSMENT OF THE PERFORMANCE
N° LZE04-06016/16/R11NK - EN

Client:	SOKÓŁKA Okna i Drzwi S.A.
Client address:	16-100 Sokółka, ul. Lotników Lewoniewskich 1

INFORMATION ABOUT PRODUCT

Manufacturer (name and address):	SOKÓŁKA Okna i Drzwi S.A. 16-100 Sokółka, ul. Lotników Lewoniewskich 1
Name and address of factory:	SOKÓŁKA Okna i Drzwi S.A. 16-100 Sokółka, ul. Lotników Lewoniewskich 1
Product:	Window system **EURO ALU**
Harmonised standard:	PN-EN 14351-1+A1:2010
Information about product, intended use and the number of the applicable system of assessment and verification of constancy of performance:	The construction product without resistance to fire and/or smoke leakage characteristics. System 3.
Unique identification code of the product-type:	„Information about unique identification code of the product-type has not been provided by client"

Information about test item

Test item: name, description, condition, identification:	The information contained in paragraph 2 of this REPORT OF THE TESTS AND ASSESSMENT OF THE PERFORMANCE
Date of receipt /sampling:	Date of receipt of the samples by the laboratory: 10.05.2016 Sampling date by the customer: 10.05.2016 Date of receipt of the complete technical documentation of the product: 10.05.2016
Receipt / sampling procedure:	PZ ZLB 18
N° of receipt / sampling protocol:	LK00-06016/16/R11NK
Further information about test item:	Window n system **EURO ALU** fig. 1; dimensions WxH = 1788x1988 mm; glass unit 4,16/4.

Information about tests:

Test commencement date:	04.07.2016
Test completion date:	05.07.2016
Further information about tests:	---

Test methods:

Initial type testing (ITT) – AoC system 3 PN-EN 14351-1+A1:2010

PN-EN 1026:2001	Windows and doors – Air permeability – Test method
PN-EN 1027:2001	Windows and doors – Watertightness – Test method
PN-EN 12211:2016	Windows and doors – Resistance to wind load – Test method
PN-EN 14351-1+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

Devices, apparatus and means of measuring:

Chamber for testing tightness and strength no LL-063 in the:

- subassembly no 1 – LK-046-1 - sensors of movements,
- subassembly no 2 – LK-046-2 - the flow of water,
- subassembly no 3 – the blowers [pressure range],
- subassembly no 4 – the blowers [airflow range],
- termohigrobarometr no – LK-014,
- measuring tape no – LL-113.

1. The scope of tests

The scope of initial type testing covered the verification of:

- air permeability,
- watertightness,
- resistance to wind load.

Personnel executing the test:

Jerzy Płoński, MSc.
Daniel Kuna, BSc.

2. Test specimen (identification)

Manufacturer: SOKÓŁKA Okna i Drzwi S.A., 16-100 Sokółka, ul. Lotników Lewoniewskich

Place of sampling: SOKÓŁKA Okna i Drzwi S.A., 16-100 Sokółka, ul. Lotników Lewoniewskich 1.

Number of samples: 1

Description of the sample: Window system **EURO ALU** fig. 1; external dimensions WxH = 1788x1988 mm; glass unit 4/16/4.

Date of sampling: May 2016, **Date of production**: May 2016.

Used components

The view and cross-sections of the window are shown on figure 1.

Unit function and description: Side Hung (with espagnolette+brake) window

Material: Wood-Alu (Pine laminated finger joint)

Module size M. w. x h

- Min.: 78*468mm, Max: 873*1668mm
- Max. Casement measurement: 809*1604mm

Corner joints, jointed using:

- Adhesive - make and type: KESTOKOL D4000 waterproof glue for timber EN204/D4 class
- Welding system: Frame press
- Corner plates - make and type: Frame, sash – tenon corner connections

Weather seals:

- Make and type:

Function	Winpro code	Supplier	Supplier code
Tape under the glass unit	USZ-1TAK10X40	KISO	Kronliste 10x4mm
Top sash gasket betwen sash and frame	USZ-1TLXTAR	TRELLEBORG	413181901
Glazing gasket for alu profile	USZ-6103-2001-49	PRIMO	6103-2001-49
Main sash gasket	USZ-713139100	TRELLEBORG	713139100
Tape for bars	USZ-3M-24-5MM	3M	VG708B24

Aluminium assembly methods:

- Frame: Sawn at 90 degrees and adjacent to each other
- Sash: Sawn at 45 degrees and assembled with aluminium angle connectors

Aluminium cladding materials:

Function	Winpro code	Supplier	Supplier code
Frame/transom	K377381	SAPA	377381
Sash profile for 2-glass	K20251	SAPA	SOD20251
Sash profile for 3-glass	K20252	SAPA	SOD20252
Angle connector	ALVINKEL	AB Metal A/S	Hjornevinkel til klimaskarm G2

Aluminium finish:

- Quality standard: Qualicoat
- Paint supplier: Lakiernia Lębork Sp. z o.o.
- Powder supplier: Akzo Nobel
- Painting form: Powder coating

Aluminium assembly:

Function	Winpro code	Supplier	Supplier code
Clips for aluminium cladding	TT-PROFILCLIPS	DENCKER	Profilclips 6-kantet, hvid 2mm 80-1002
Nail for clips	SZT-PL2025AGB	OTTENSTEN	PL2025AGB

Hardware:

Model: 700*700mm				
	Qty.	Location	Material	Surface treatment
Hinges – butt window hinges KEPT	2	Frame/sash	Steel	Corrosion treated
Handle - Hoppe Mini Tokyo	1	Sash	Aluminium	Corrosion treated
Fastening points – keepers JASA COMPANY 1BESTS61	2	Frame	Steel	Corrosion treated
Fastening system – espagnolette FIX S2111	1	Sash	Steel	Corrosion treated

Glazing units:

- Make and type: Press-Glass EN 1279
- Installation system/materials: Installation instructions from the glass industry.

Wood treatment:

- Method and product description:

Finish steps	Application method	No of layers	Product	Supplier
Impregnation	Flow-coating	1	TEKNOL AQUA 1410-01	TEKNOS
Grounding/base coat	Spraying by gun	1	ANTI STAIN AQUA 5200-00	TEKNOS
Sealing joints-fugue	Gun for fugue	1	GORI 691-32 FLEX	TEKNOS
Top Coat	Spraying	1	AQUA TOP 2600-73	TEKNOS

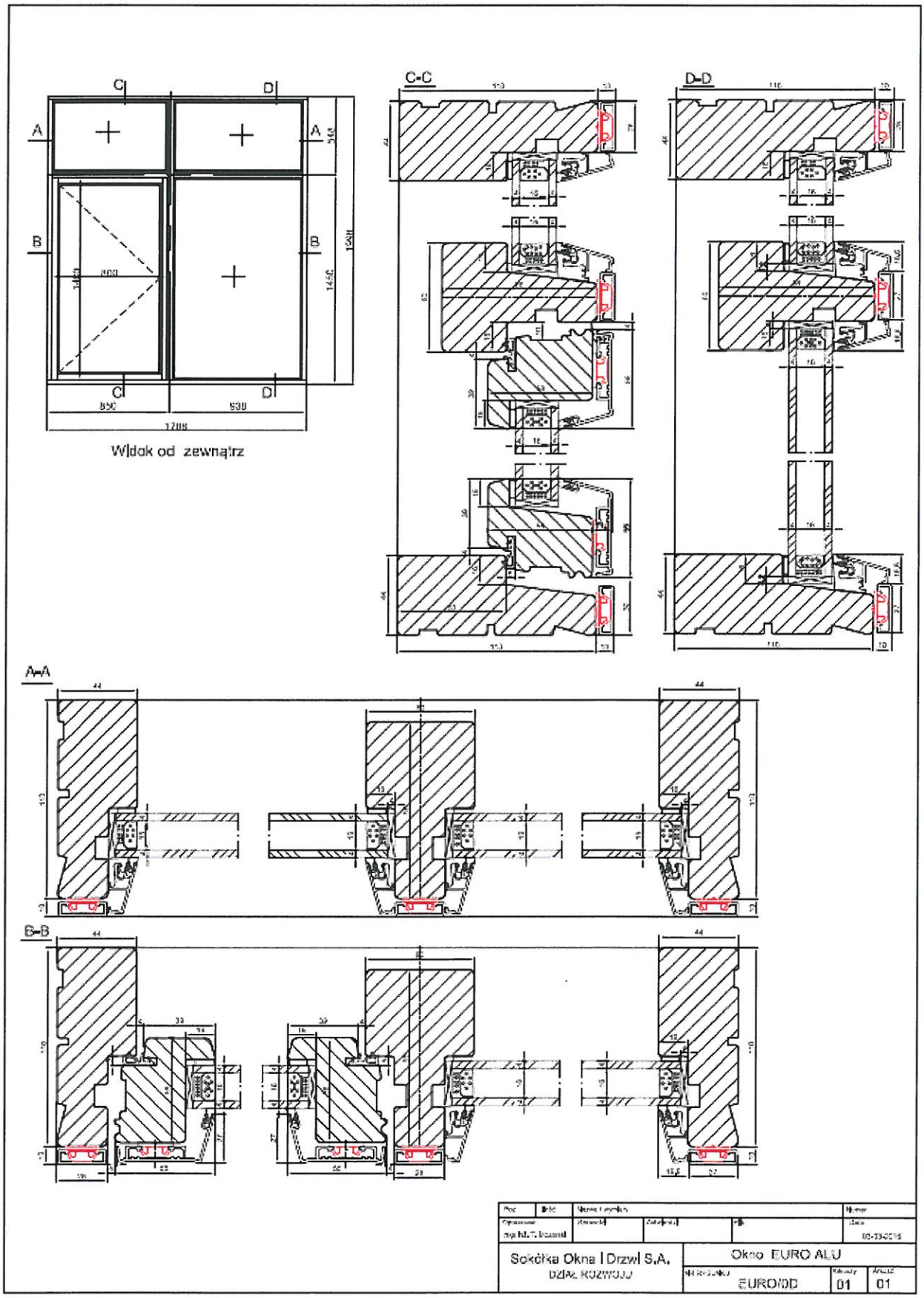


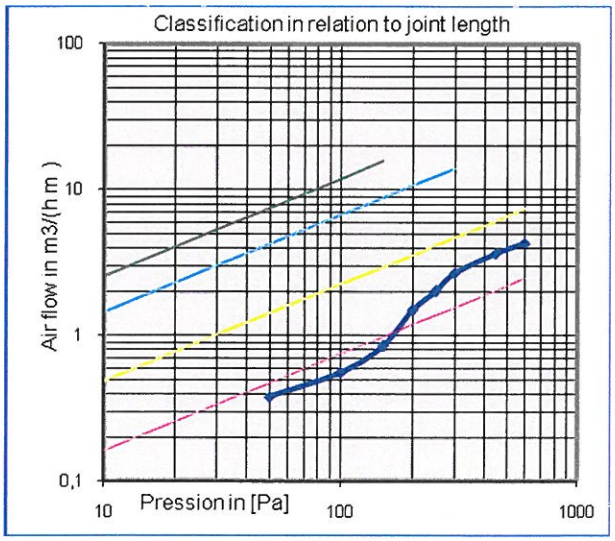
Fig 1 The cross sections of the window

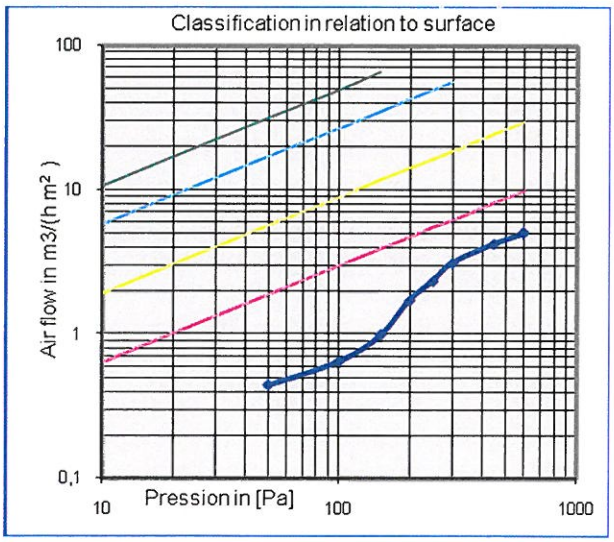
3. The methods and results

3.1. Air permeability - before of the resistance to wind load

The test was carried out in accordance with the PN-EN 1026:2001.
Test results are shown in table N° 1.

Air permeability								Table 1
specimen area 3,6 m^2	joint length 4,2 m	temp 25 °C	humidity 45 %	atm. press 1002 hPa				
positive test pressure								
Air flow		Value of air permeability at pressure, Pa						
		50	100	150	200	250	300	450	600
overall	m^3/h	1,6	2,3	3,5	5,0	7,0	9,2	12,0	12,4
in relation to joint length	m^3/hm	0,38	0,55	0,83	1,19	1,67	2,19	2,86	2,95
in relation to surface	m^3/hm^2	0,44	0,64	0,97	1,39	1,94	2,56	3,33	3,44
air inf. coefficient , a	$m^3/(mhdaPa)^{2/3}$	0,13	0,12	0,14	0,16	0,19	0,23	0,23	0,19
negative test pressure									
Air flow		Value of air permeability at pressure, Pa							
		50	100	150	200	250	300	450	600
overall	m^3/h	1,6	2,4	3,6	7,5	10,0	13,4	18,8	24,0
in relation to joint length	m^3/hm	0,38	0,57	0,86	1,79	2,38	3,19	4,48	5,71
in relation to surface	m^3/hm^2	0,44	0,67	1,00	2,08	2,78	3,72	5,22	6,67
air inf. coefficient , a	$m^3/(mhdaPa)^{2/3}$	0,13	0,12	0,14	0,24	0,28	0,33	0,35	0,37
numerical average									
Air flow		Value of air permeability at pressure, Pa							
		50	100	150	200	250	300	450	600
overall	m^3/h	1,6	2,4	3,6	6,3	8,5	11,3	15,4	18,2
in relation to joint length	m^3/hm	0,38	0,56	0,85	1,49	2,02	2,69	3,67	4,33
in relation to surface	m^3/hm^2	0,44	0,65	0,99	1,74	2,36	3,14	4,28	5,06
air inf. coefficient , a	$m^3/(mhdaPa)^{2/3}$	**0, 16**						-	-





Requirement	Standard	Result
Q_{lmax} < 2,25 m^3/hm under 300 Pa	PN-EN 12207:2001	Q_{lmax} = 1,31 $m^3/(hm)$ (class 3)
Q_{pmax} < 3,0 m^3/hm^2 under 600 Pa	PN-EN 12207:2001	Q_{pmax} = 1,53 $m^3/(hm^2)$ (class 4)
In accordance with p. 4.6 of PN-EN 12207:2001	PN-EN 12207:2001	**class 4**
Q_{lmax} – the maximum value of air flow in relation to joint length Q_{pmax} - the maximum value of air flow in relation to surface		
Measurement uncertainty of ±5%. The confidence level of 95% for k = 2		

3.2. Watertightness

The test was carried out in accordance with the PN-EN 1027:2001, method 1A.

Window with flat.

Test results are shown in table N° 2. The wiew of the window - fig 2.

Watertightness		Table 2
Pressure, Pa	Testing time, min	Notes
0	15	no leakage
50	5	no leakage
100	5	no leakage
150	5	no leakage
200	5	no leakage
250	5	no leakage
300	5	no leakage
450	5	no leakage
600	5	no leakage
750	5	no leakage
900	5	no leakage
1050	5	no leakage
1200	2	leakage

Requirement	Standard	Result
no leakage	PN-EN 12208:2001	**Class E1050**

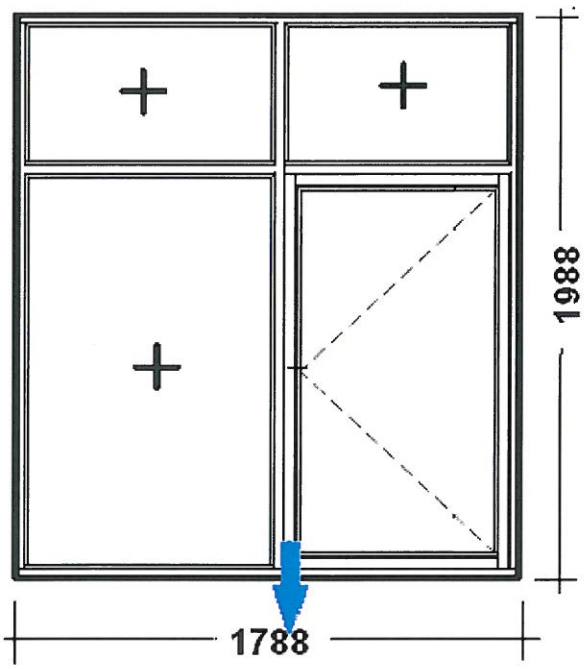


Fig 2 Scheme of the window

3.3. Resistance to wind load

The test was carried out in accordance with the PN-EN 12211:2016.

Measurement of deflection with P1. Test results are shown in table N° 3a ÷ 3b.

Measurement of deflection **transom** [mm]				Table 3a
Point of measurement	Positive test pressure [width 1900 mm] - Load [Pa]			
	400	800	1200	0
Point 1	0,3	0,7	1,0	0,0
Point 2	1,9	3,3	5,5	0,1
Point 3	0,2	0,6	1,0	0,0
Displacement, mm	1,7	2,7	4,5	---
Deflection 1/	1118	704	422	---
Point of measurement	Negative test pressure [width 1900 mm] - Load [Pa]			
	400	800	1200	0
Point 1	0,3	0,5	1,0	0,0
Point 2	2,2	3,6	6,0	0,0
Point 3	0,1	0,5	1,1	0,1
Displacement, mm	2,0	3,1	4,95	---
Deflection 1/	950	613	380	---
Measurement uncertainty of ±1N. The confidence level of 95% for k = 2				

Measurement of deflection **mulion** [mm]				Table 3b
Point of measurement	Positive test pressure [width 800 mm] - Load [Pa]			
	400	800	1200	0
Point 1	0,4	0,4	1,0	0,3
Point 2	1,4	2,7	4,2	0,2
Point 3	1,2	2,9	3,8	0,1
Displacement, mm	0,6	1,1	1,8	---
Deflection 1/	1433	782	478	---
Point of measurement	Negative test pressure [width 800 mm] - Load [Pa]			
	400	800	1200	0
Point 1	0,4	0,6	1,2	0,1
Point 2	1,3	2,6	3,7	0,3
Point 3	1,2	2,5	3,2	0,2
Displacement, mm	0,5	1,1	1,5	---
Deflection 1/	1720	782	573	---
Measurement uncertainty of ±1N. The confidence level of 95% for k = 2				

Requirement	Standard	Result
f ≤ L/300	PN-EN 12210:2001	**Class C3 (1200 Pa)**

Repeated load P2 Number of cycles: 50,
Positive pressure: 600 Pa, Negative pressure: 600 Pa
Test result: no visible changes were observed.

Safety test P3 Positive pressure: 1800 Pa, Negative pressure: 1800 Pa
Test result: no visible changes were observed.

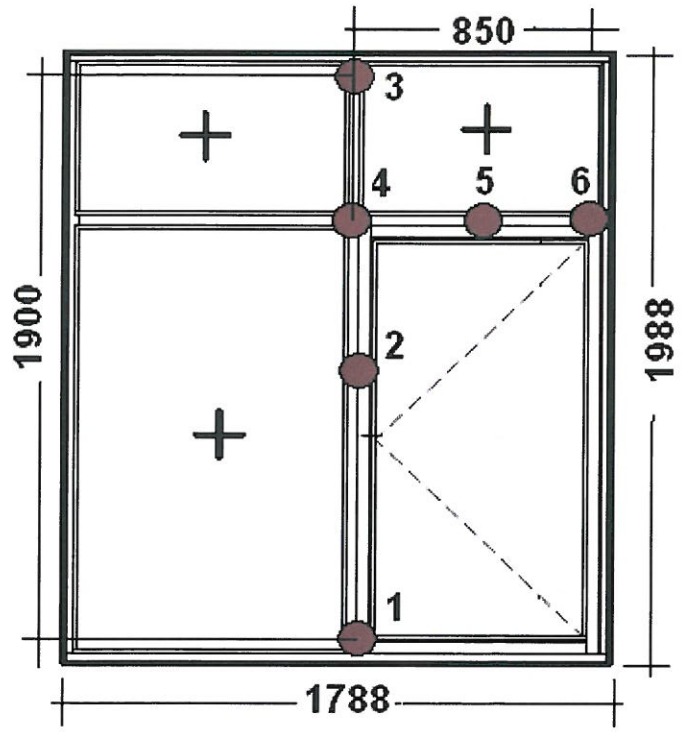
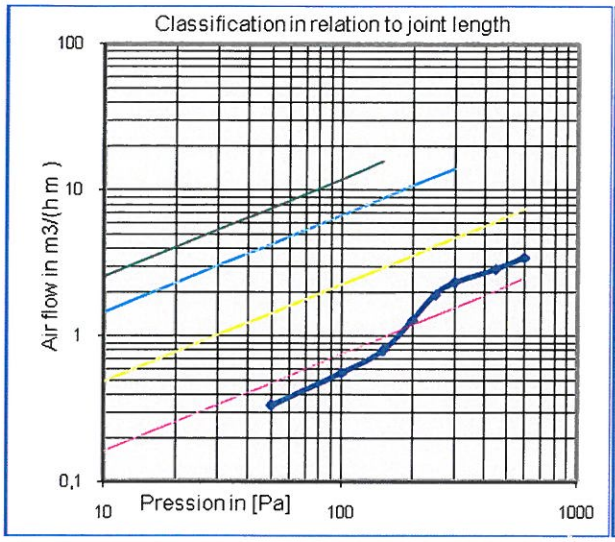


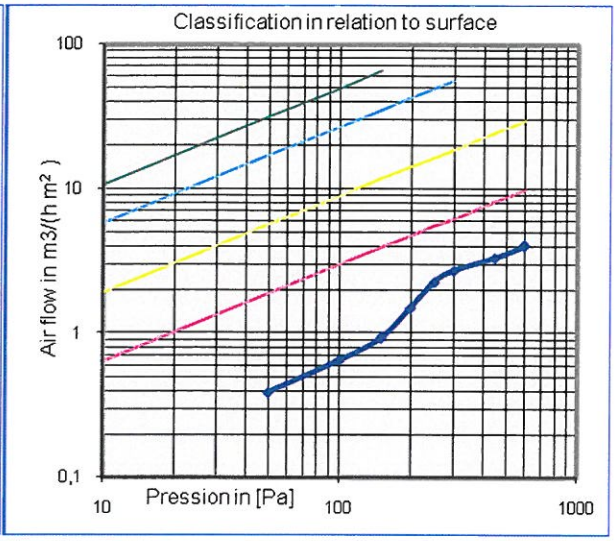
Fig 3 The positions of measurement points

3.4. Air permeability – after of the resistance to wind load

The test was carried out in accordance with the PN-EN 1026:2001.
Test results are shown in table N° 4.

Air permeability								Table 4
specimen area 3,6 m^2	joint length 4,2 m	temp 25 °C	humidity 45 %	atm. press 1002 hPa				
positive test pressure								
Air flow		Value of air permeability at pressure, Pa						
		50	100	150	200	250	300	450	600
overall	m^3/h	1,40	2,50	3,70	5,60	8,00	8,90	11,30	13,00
in relation to joint length	m^3/hm	0,33	0,60	0,88	1,33	1,90	2,12	2,69	3,10
in relation to surface	m^3/hm^2	0,39	0,69	1,03	1,56	2,22	2,47	3,14	3,61
air inf. coefficient , a	$m^3/(mhdaPa)^{2/3}$	0,11	0,13	0,14	0,18	0,22	0,22	0,21	0,20
negative test pressure								
Air flow		Value of air permeability at pressure, Pa						
		50	100	150	200	250	300	450	600
overall	m^3/h	1,40	2,20	3,00	5,20	8,20	10,60	12,80	16,00
in relation to joint length	m^3/hm	0,33	0,52	0,71	1,24	1,95	2,52	3,05	3,81
in relation to surface	m^3/hm^2	0,39	0,61	0,83	1,44	2,28	2,94	3,56	4,44
air inf. coefficient , a	$m^3/(mhdaPa)^{2/3}$	0,11	0,11	0,12	0,17	0,23	0,26	0,24	0,25
numerical average								
Air flow		Value of air permeability at pressure, Pa						
		50	100	150	200	250	300	450	600
overall	m^3/h	1,40	2,35	3,35	5,40	8,10	9,75	12,05	14,50
in relation to joint length	m^3/hm	0,33	0,56	0,80	1,29	1,93	2,32	2,87	3,45
in relation to surface	m^3/hm^2	0,39	0,65	0,93	1,50	2,25	2,71	3,35	4,03
air inf. coefficient , a	$m^3/(mhdaPa)^{2/3}$	**0,17**						-	-





Requirement	Standard	Result
Q_{lmax} < 2,25 m^3/hm under 300 Pa	PN-EN 12207:2001	Q_{lmax} = 1,05 m^3/(hm) (class 3)
Q_{pmax} < 3,0 m^3/hm^2 under 600 Pa	PN-EN 12207:2001	Q_{pmax} = 1,22 $m^3/(hm^2)$ (class 4)
In accordance with p. 4.6 of PN-EN 12207:2001	PN-EN 12207:2001	**class 4**
Q_{lmax} – the maximum value of air flow in relation to joint length Q_{pmax} - the maximum value of air flow in relation to surface		
Measurement uncertainty of ±5%. The confidence level of 95% for k = 2		

4. Classification

On the base of test results ITT the classification is presented in table no. 5.

Side Hung Window system **EURO ALU**		Table 5
Property	Classification	Classification standard
Air permeability	**class 4**	PN-EN 12207:2001
Watertightness	**class E1050**	PN-EN 12208:2001
Resistance to wind load	**class C3**	PN-EN 12210:2001
Safety test	**+12800 Pa / -1800 Pa**	

Responsible for the test

Jerzy Płoński, Msc.

Płoński

Authorizing person

Ołeksij Kopyłow, PhD

Warsaw.....

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Head of Testing Laboratory

Marzena Jakimowicz, Msc.

Jakimowicz Marz