TEST PROTOCOL

№ 02 /28.01.2022

Designation of the product:	AL window produced on 11 October 2021
Producer:	"AEROCARBON GLOBAL"; Address: 238203, Russia, Kaliningrad region, Gvardeisky district, Prudnoye settlement, building 1, Territory 1, Industrial zone "Prudnoye"
Client:	"LLC TSU RUS", Russia, 119333, Moscow, prosp. Leninsky, House 52, basement. pom. II room 5
Assigning document:	Contract: № 02 / 30.11.2021
System of assessment for conformity:	System "3"
Standard:	BDS EN 14351-1:2006+A2:2016
Essential requirements:	
	3. Watertightness
	4. Resistant to wind load
	5. Sound insulation
	6.1 Thermal transmittance
	6.3. Air permeability
Test sample:	1 piece sample – request of 30.11.2021
Period for conducting the testing:	24.01.2022 – 28.01.2022

Description of the product tested:

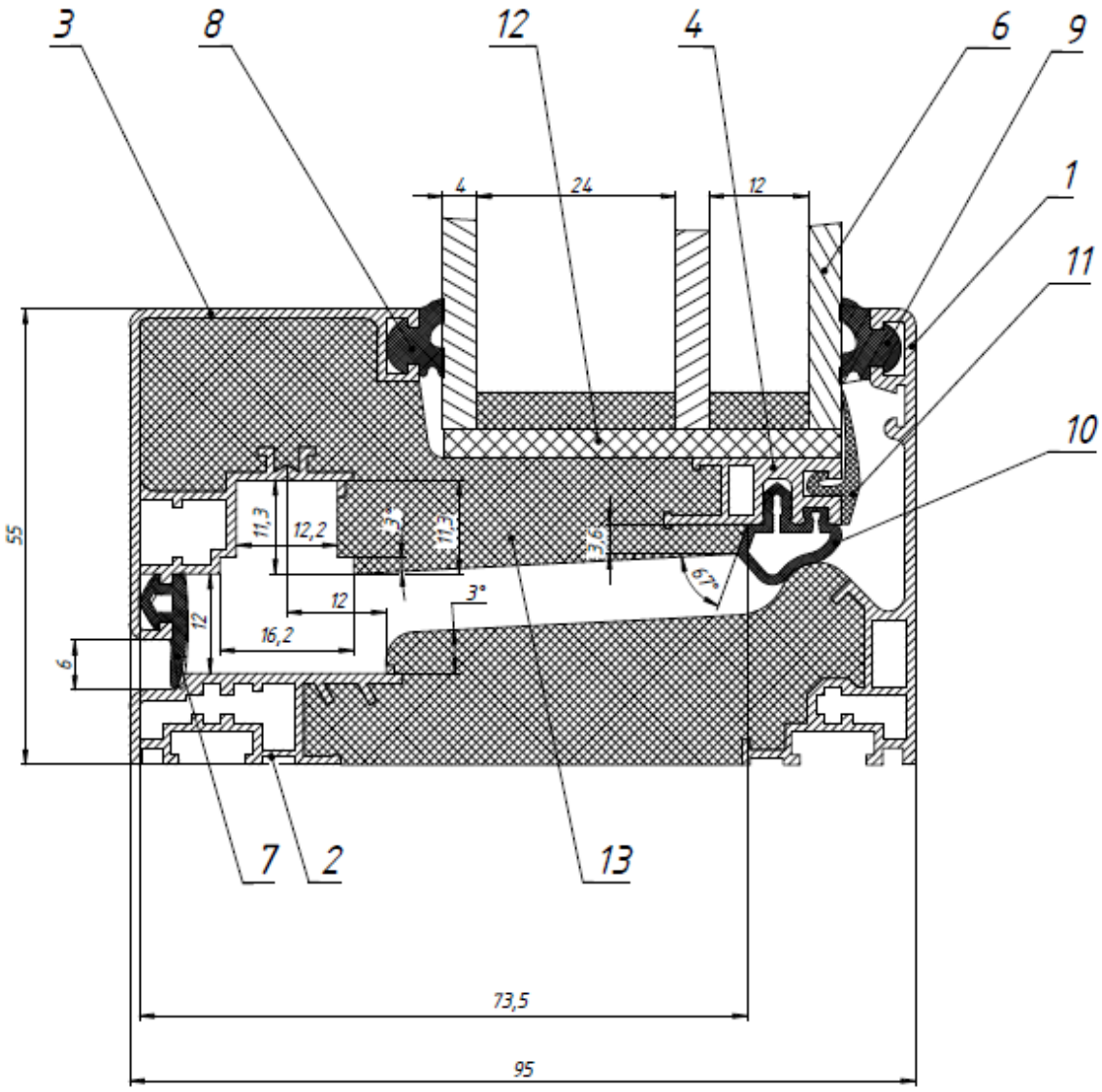
Overall dimension: 1230 mm x 1480

Frame: AEROCARBON GLOBAL 55

Composite AeroCarbon® window profiles are the perfect combination of two lightweight and durable components - a high-quality aluminum outer protection profile with a special polymer coating and an energy-efficient composite foam core. Frames with a mounting thickness of 55mm

Type of glass: Double-glazed window 48 mm with energy-saving coating

Sealing - sealant, material - TPE (Thermoplastic elastomer), expansion gasket - foamed polyethylene


3
8
12
4
6
9
1
11
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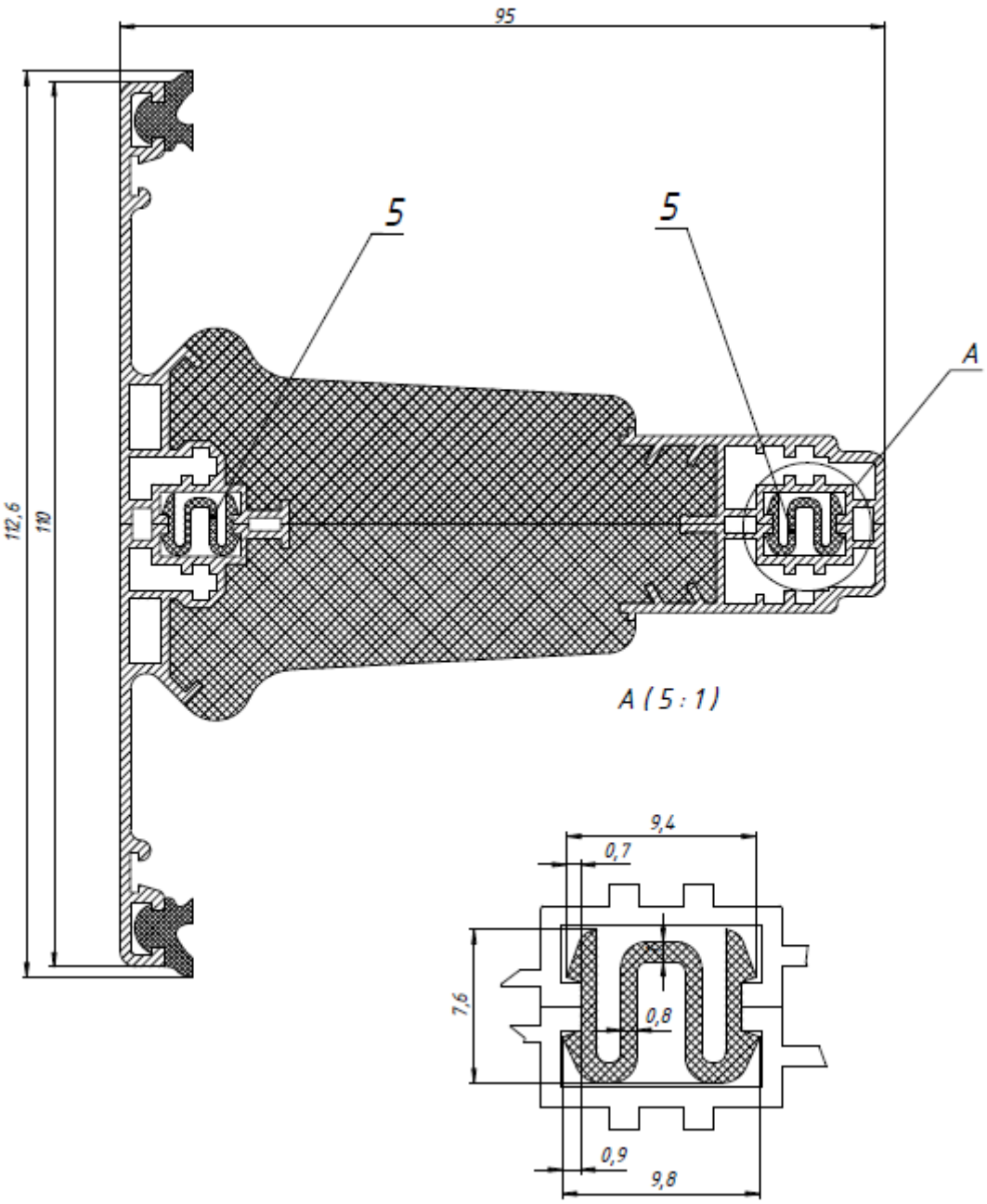
4
24
12
55
11,3
12,2
3°
11,3
13,6
9°
12
3°
16,2
6
7
2
13
73,5
95

Рама сдвоенная



Results from testing

№ in order	Essential characteristics	Measure unit	Testing method	Performance	Harmonised technical specification
1	**2**	**3**	**4**	**5**	**6**
1.	Watertightness	-	BDS EN 1027	Class A3	BDS EN 14351-1+A2
2.	Resistant to wind load	-	BDS EN 12211	Class 4C	BDS EN 14351-1+A2
3.	Sound insulation $R_w(C;C_{tr})$	dB	BDS EN ISO 10140-2	37 (-1;-5)	BDS EN 14351-1+A2
4.	Thermal transmittance (U_w)	W/m^2K	BDS EN ISO 12567-1	1.1	BDS EN 14351-1+A2
5.	Air permeability	-	BDS EN 1026	Class 4	BDS EN 14351-1+A2

Technical devices used:

Indications of moving 1, 2, 3, 4, 5, 6 type 8712-50 – Certificate of calibration № 1457A-D-21/13.05.2021 , № 1458A-D-21/13.05.2021 , № 1459A-D-21/13.05.2021 , № 1460A-D-21/13.05.2021 , № 1461A-D-21/13.05.2021 , № 1462A-D-21/13.05.2021 "Metrologiya Holding";

Shtrih measure to the U-shaped manometer, Type: Pa / UI-γ 0,88, ID № 1695 calibration certificate №831A-D-19 от 08.04.2019 , the "Mertologia Holding";

Flowmeter type: "Aqua metro" sensor type water: JMD / IFMA 0035, № Id 4628833 - calibration certificate № 02-OP-27/15.02.2019 "Kalibra-Bulgaria" LTD;

Mini Air 60 - Mini; 40 m / s Anemometer - pressure vacuum Protocol check № 22522 / 18.02.2014g. K.Schulten;

Pressure sensor PU +/- 4000 Pa -Protocol verification № 22521 / 18.02.2014, the K.Schulten;

Meter speed air type: Testo 416 Idn № 02512879, certificate of calibration from : № 14833 от 28.03.2019 "Total-Test" LTD.

Integrating Sound Meter Idn. №1404274 Type: NOR 140, Calibration certificate: :№082-ИАВ / 27.05.2020 г. "Bulgarian Institute of Metrology" – BIM

Thermometer digital 1,2,5,6,7,8 type TO 92,.№1468A-T-21/13.05.2021, .№1467A-T-21/13.05.2021, .№1466A-T-21/13.05.2021, .№1465A-T-21/13.05.2021, .№1464A-T-21/13.05.2021, .№1463A-T-21/13.05.2021 - "Metrologiya Holding";

TECHNICAL DOCUMENTATION USED: (list of technical specifications with requirements and methods for testing, rules and regulations etc. documents related with a performance evaluation.).

BDS EN 14351-1:2006+A2:2016– Windows and doors - Product standard, performance characteristics - Part 1: Windows and external pedestrian doorsets;

BDS EN ISO 10140-2:2021– Acoustics — Laboratory measurement of sound insulation of building elements — Part 2: Measurement of airborne sound insulation;

BDS EN ISO 12567-1:2010 - Thermal performance of windows and doors - Determination of thermal transmittance by the hot-box method - Part 1: Complete windows and doors;

BDS EN 1027:2016 – Windows and doors - Watertightness - Test method;

BDS EN 1026:2016 - Windows and doors - Air permeability - Test method;

BDS EN 12211:2016 - Windows and doors - Resistance to wind load - Test method;

BDS EN 12210:2016 - Windows and doors - Resistance to wind load – Classification;

BDS EN 12208:2003 - Windows and doors - Watertightness – Classification;

BDS EN 12207:2017- Windows and doors - Air permeability – Classification;

BDS EN ISO 717-1:2021 - Acoustics — Rating of sound insulation in buildings and of building elements — Part 1: Airborne sound insulation;

Applications:

3. Watertightness

BDS EN 1027 – Windows and doors - Watertightness - Test method

Watertightness: EN 12208 -

Spaying method A Number of nozzles: 3 Vol. Water: 360.0 litre/hour
Spaying angle:24 Degree : 6.0 litre/minute
Add. spraying pipe Number of nozzles: 0 Vol. Water: 0.0 litre/hour
(0.0 litre/nozzle) : 0.0 litre/minute

1. Watertightness pressure

Pressure Pa		Time	Remark
Nominal	Real		
0	0	00:15:00	OK
50	50	00:05:00	OK
100	99	00:05:00	OK
150	-10	00:05:00	trickling:00:00:24
200	0	00:05:00	-
250	0	00:05:00	-
300	0	00:05:00	-
450	0	00:05:00	-
600	0	00:05:00	-

Watertightness Class: A3

Point of water ingress :

Probable cause of leakage :

4. Resistant to wind load

BDS EN 12211 - Windows and doors - Resistance to wind load - Test method

Wind Resistance: EN 12210

Temperature: 20 Celsius Humidity: 75 % Air pressure: 1013.0 HPa

Wind Resistance: EN 12210		
P1 for deflection	1600	-1600
P2 for cycles	-800	800
P3 for safety test	-2400	2400

Deflection:

Distance between the way transducers

a01 <-> c03 = 750 mm

A = 1/150 B = 1/200 C = 1/300

Wind Resistance P1 pressure

3 Pressure pulses 1760 Pa implemented

Pressure Desired	Pressure Actual	Distortion Absolute						Distortion Relative		Distortion class
1600	1594	a01=	-0.21	b02=	-0.67	c03=	-0.37	f01=	-0.38	C (1/>999)
0	0	a01=	0.00	b02=	0.04	c03=	0.02	f01=	0.03	

Class: 4

Wind Resistance P1 suction

3 Pressure pulses -1760 Pa implemented

Pressure Desired	Pressure Actual	Distortion Absolute						Distortion Relative		Distortion class
-1600	-1606	a01=	0.05	b02=	0.22	c03=	0.04	f01=	0.17	C (1/>999)
0	0	a01=	0.00	b02=	0.00	c03=	0.02	f01=	-0.01	

Class: 4

Rolling shutter box

Roll shutter box P1 pressure

3 Pressure pulses 1760 Pa implemented

Pressure Desired	Pressure Actual	Distortion Absolute						Distortion Relative		Distortion %
1600	1606	a01=	-0.22	b02=	-0.75	c03=	-0.42	f01=	-0.43	1 / 2860
0	0	a01=	0.01	b02=	0.01	c03=	0.00	f01=	0.00	1 / 0

Deflection OK

Roll shutter box P1 suction

3 Pressure pulses -1760 Pa implemented

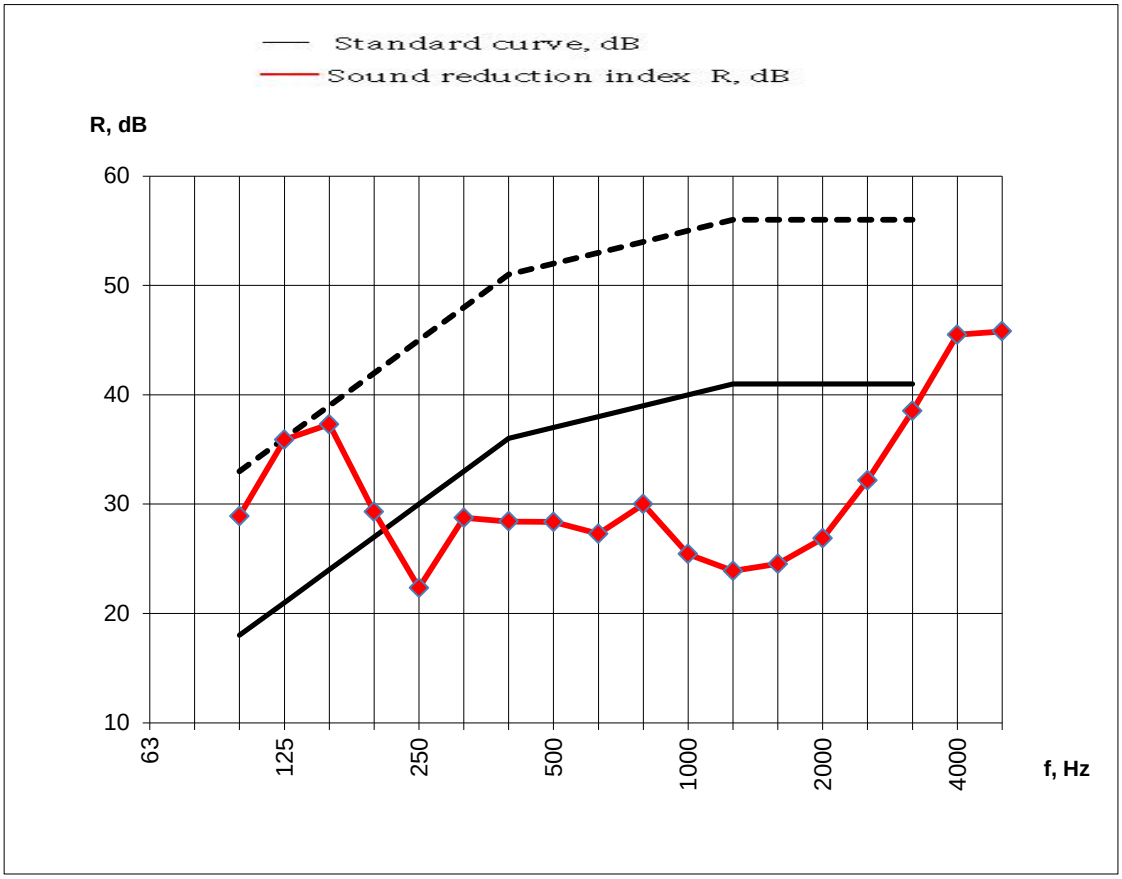
Pressure Desired	Pressure Actual	Distortion Absolute						Distortion Relative		Distortion %
-1600	-1604	a01=	0.05	b02=	0.22	c03=	0.01	f01=	0.19	1 / 6473
0	0	a01=	0.01	b02=	0.00	c03=	0.01	f01=	-0.01	1 / -807

Deflection OK

5. Sound insulation

BDS EN ISO 10140-2 – Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation (ISO 10140-2:2010)

f, Hz	R, dB
50	-
63	-
80	-
100	28.9
125	35.9
160	37.3
200	29.3
250	22.3
315	28.7
400	28.4
500	28.4
630	27.3
800	30.0
1000	25.4
1250	23,9
1600	24.5
2000	26.9
2500	32.2
3150	38.5
4000	45,5
5000	45,8



Legend: R-index, volume down, dB
f - frequency, Hz

R_w, dB	37 dB
C, dB	-1 dB
Ctr, dB	-5 dB
R_w (C;Ctr)	37(-1;-5)

6.1 Thermal transmittance

BDS EN ISO12567-1 – Thermal performance of windows and doors - Determination of thermal transmittance by the hot-box method - Part 1: Complete windows and doors (ISO 12567-1:2010)

Air temperature in hot chamber:	Th = 24.9 °C
Air temperature in cold chamber:	Tc = 12.7 °C
Environment temperature:	To = 18.2 °C
Thermal stream:	F = 24 W
Density of the thermal stream:	f = 13 W/m^2
Total thermal resistance:	R = 0.94 m^2K/ W
Thermal transmittance:	Uw = 1.1 W/m^2K

6.3. Air permeability

BDS EN 1026 - Windows and doors - Air permeability - Test method

Air Permeabitity: EN 12207 in accordance with BS EN 1026

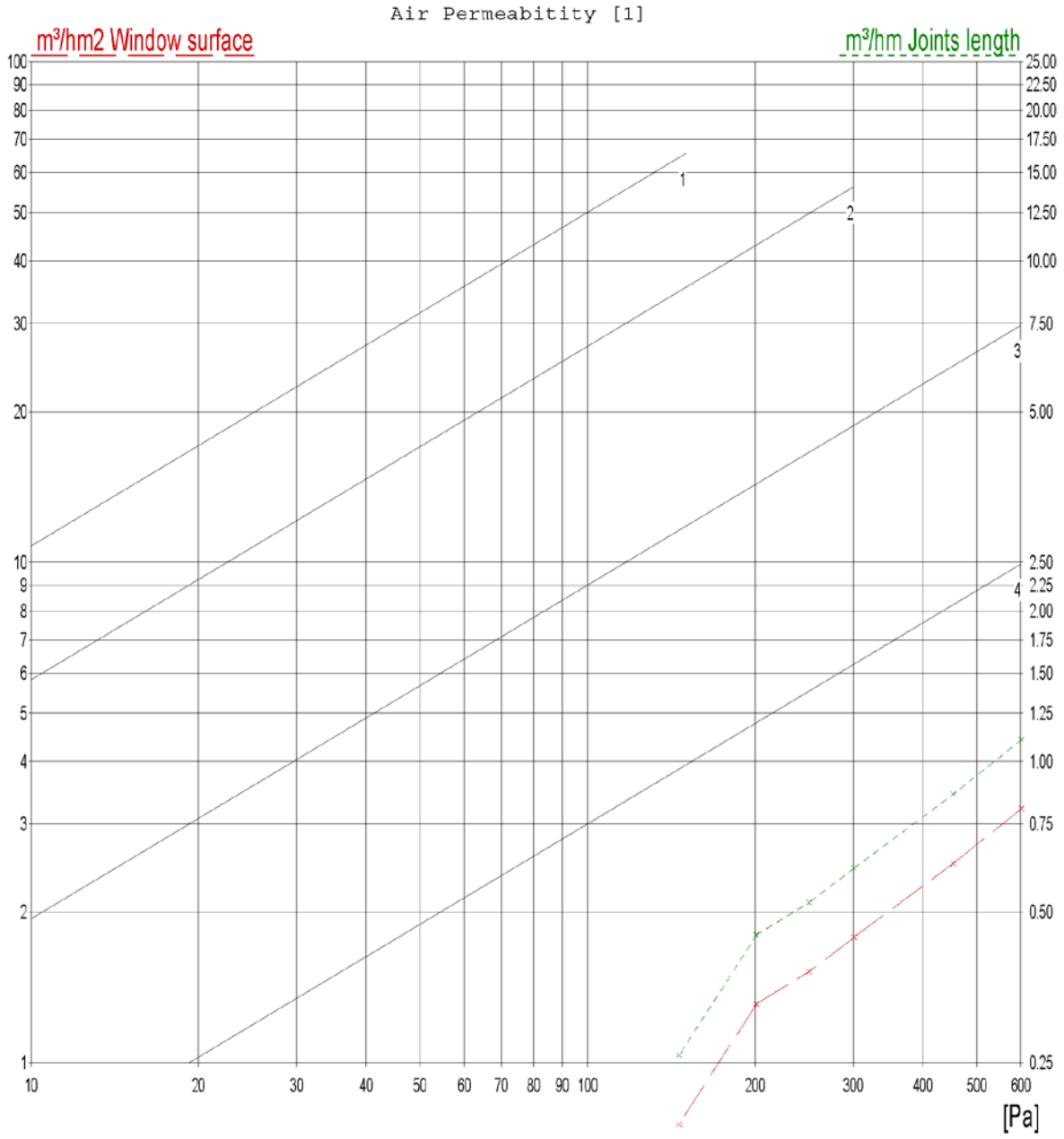
Window surface: 1.820 m2 Seal length: 5.300 m

1. Air Permeabitity pressure / Air Permeabitity suction

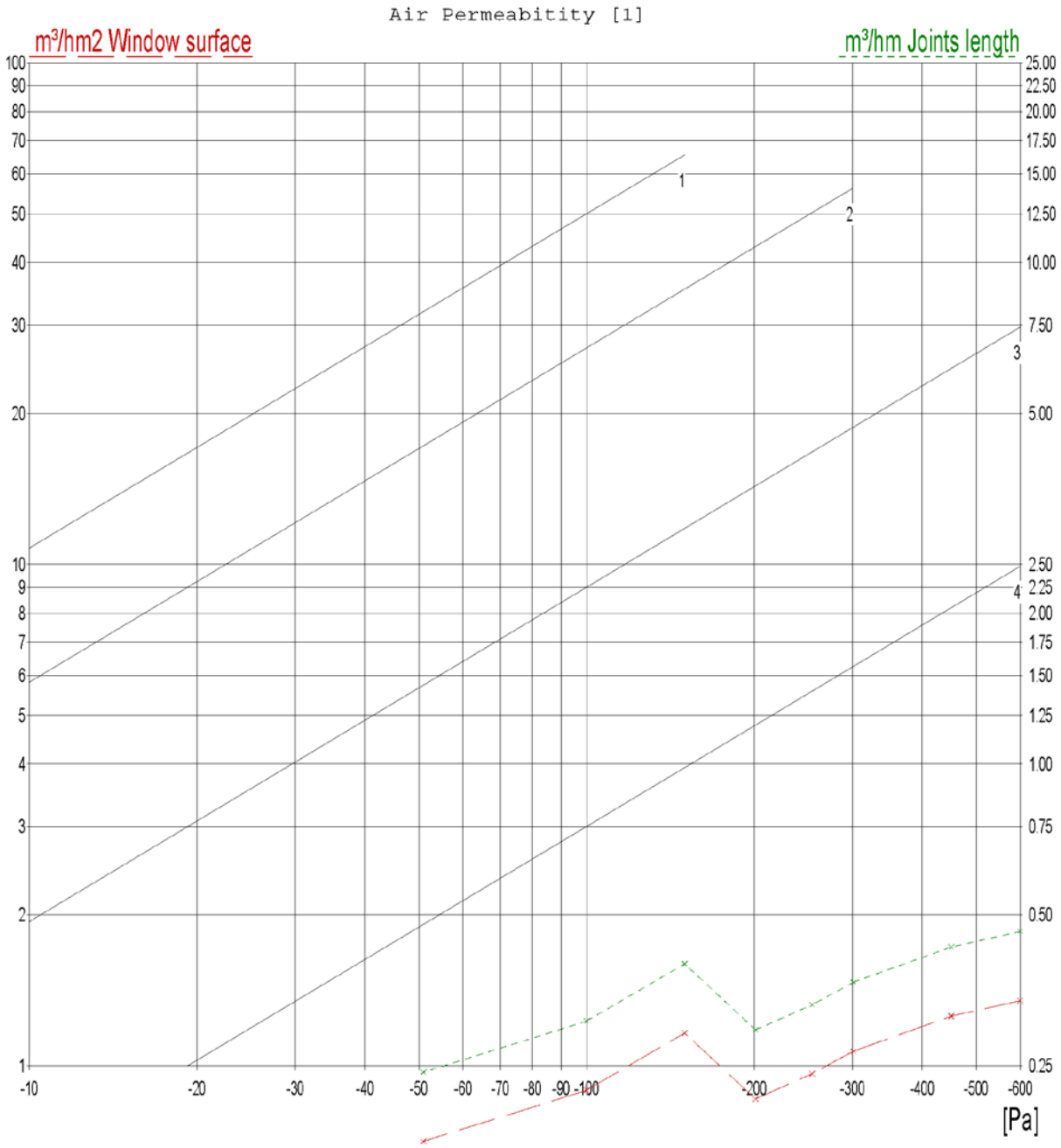
Pressure Pa Nominal	Real	Qc mih	Qtc mih	Window surface mi/h/mi	class	Joints length mi/h/m	class
+							
50	50	0.00	0.00	0.00	4	0.00	4
100	101	0.00	0.00	0.00	4	0.00	4
150	146	0.00	1.37	0.75	4	0.25	4
200	201	0.00	2.38	1.31	4	0.45	4
250	250	0.00	2.76	1.52	4	0.52	4
300	301	0.00	3.24	1.78	4	0.61	4
450	454	0.00	4.55	2.50	4	0.85	4
600	601	0.00	5.86	3.22	4	1.10	4
-							
-50	-51	0.00	1.28	0.70	4	0.24	4
-100	-100	0.00	1.62	0.89	4	0.30	4
-150	-150	0.00	2.11	1.16	4	0.39	4
-200	-201	0.00	1.56	0.85	4	0.29	4
-250	-254	0.00	1.75	0.96	4	0.33	4
-300	-301	0.00	1.94	1.06	4	0.36	4
-450	-451	0.00	2.28	1.25	4	0.43	4
-600	-600	0.00	2.45	1.34	4	0.46	4
Average							
50	50	0.00	0.64	0.35	4	0.12	4
100	100	0.00	0.81	0.44	4	0.15	4
150	148	0.00	1.74	0.95	4	0.32	4
200	201	0.00	1.97	1.08	4	0.37	4
250	252	0.00	2.26	1.24	4	0.42	4
300	301	0.00	2.59	1.42	4	0.48	4
450	452	0.00	3.42	1.87	4	0.64	4
600	600	0.00	4.15	2.28	4	0.78	4

Pressure: 4 Suction: 4 Average value: 4

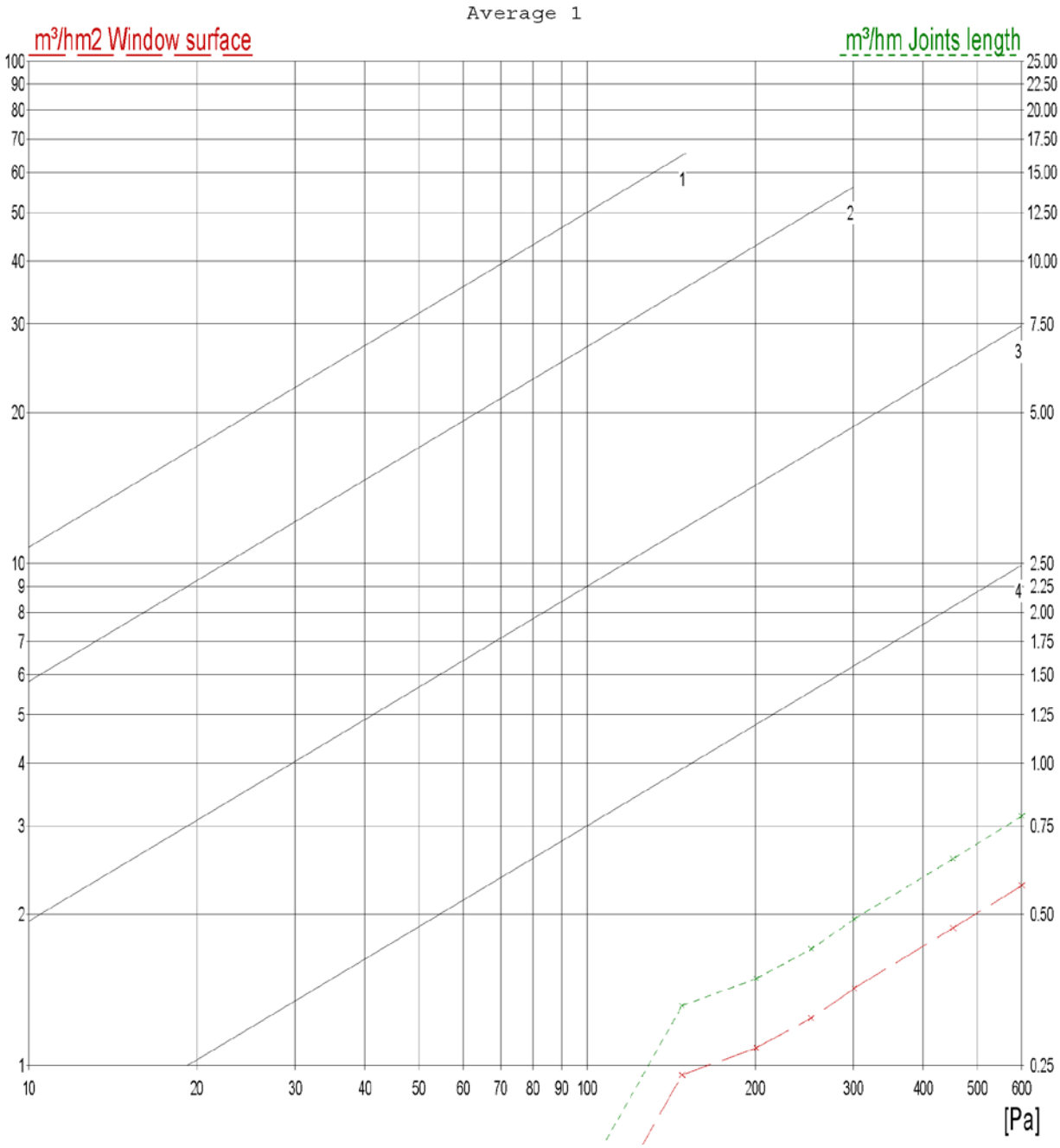
Air Permeabitity pressure:



Air Permeabitity suction:



Air Permeabitity Average:



Head of test:
/eng. I.Georgieva/

Head of laboratory:
(PhD eng. H.Georgiev)