BUILDING RESEARCH INSTITUTE (N I S I) Ltd.
NOTIFIED TEST LABORATORY
Identification number NB 2032 of the Register of EC
Licence granted by the Ministry of Development and Public Works (MRRB), No CPD 10–2032
1618 Sofia, BULGARIA, 86 Nikola Petkov Blvd, tel.+359 2 856 10 82, fax +359 2 955 96 38, e-mail: nisi_sofia@abv.bg

TEST REPORT
PRODUCT TYPE DETERMINATION
PTD -16.16 / 15.05.2016

The tests are carried out in compliance with the ***Regulation (EU) № 305/2011 (CPR) of the European Parliament and the Council of the European Union.***

Product:	**Window aluminum profiles „VIVA ALUMINIUM SYSTEMS“ Opening system with thermal break TBO 70**
Producer:	Factory of VIAS Ltd, Bulgaria, Shumen, 68A “Rishki prohod“ Blvd.
Applicant:	VIAS Ltd, Bulgaria, Shumen, 68A “Rishki prohod“ Blvd.
Document for assignment:	Contract No 13/2016
Test samples:	One window with dimensions 1750/2550 mm, produced in the month. March 2016. Details of the window are supplied in Annex 1.
Test period:	From 11.04.2016 to 17.05.2016
Assessment of the performance:	**The submitted Window aluminum profiles „VIVA ALUMINIUM SYSTEMS“ opening system with thermal break TBO 70 meets watertightness class 3A, resistance to wind load class C2, load-bearing capacity devices class 4, air permeability class 4, weighted sound reduction index R_w (C; C_{tr}) = 40 (-1; -4) dB; thermal transmittance U_f = 1,51 W/(m^2.K), U_w = 0,83 W/(m^2.K).**

Head of Test Laboratory:
Res. Ass. Eng. Tsvetana Gyurova

General Manager of NISI:
Prof. Dr. Eng. Rumen Guglev

НАУЧНОИЗСЛЕДОВАТЕЛСКИ СТРОИТЕЛЕН ИНСТИТУТ - НИСИ - ОСНОВАН 1895 - СОФИЯ

The Test Report consists of 12 pages.
Copies of separate parts of the Test Report can be made with written consent of the NISI Ltd.

Testing data:

No	Characteristic	Unit of measu-rement	Test method	Test result	Requirement according
1	*2*	*3*	*4*	*5*	*6*
1.	Watertightness in static test pressure P = 100 Pa *	class	EN 1027 Method A	3A	EN 12208 The requirements are given in Annex 2 of the test report.
*	Detailed test results are given in Annex 2 of the test report.				
2.	Resistance to wind load *	class		C2	EN 12210
2.1	Deformation (F_p) of the wing frame at wind load :			P = ± 800 Pa	P = ± 800 Pa f < (1/300) L
	- I-st vertical axis (point 2);	mm		+0,26 / -0,20	< ±5,33
	- II-nd vertical axis (point 5);	mm		+1,62 / -1,47	< ±5,33
	- III-rd vertical axis (point 8);	mm		+1,32 / -1,34	< ±5,33
	- IV-th vertical axis (point 11).	mm	EN 12211	+0,46 / -0,36	< ±5,33
2.2	Repeated pressure test - 50 times positive and negative pressures	-		P = ± 400 Pa Functional qualities and links with hardware are reserved.	P = ± 400 Pa Functional qualities of the window and links with hardware to be reserved.
2.3	Safety test at triple pressure	-		P = ± 1200 Pa Functional qualities and links with hardware are reserved.	P = ± 1200 Pa Functional qualities of the window and links with hardware to be reserved.
*	Detailed test results are given in Annex 3 of the test report.				
3.	Load-bearing capacity devices *	class		4	EN 13115
3.1	Bending at load with a horizontal force for 5 min that is applied to the wing with hinges. The wing is rotated on a vertical axis and is locked at the top.	mm	EN 14609	P = 350 N $a_{residual}$ = 78,4 mm Functional qualities and links with hardware are reserved	P = 350 N Functional qualities of the window and links with hardware to be reserved
3.2	Bending at load with a horizontal force for 5 min that is applied to the wing with hinges. The wing is rotated on a horizontal axis and is locked at one end.			P = 350 N $a_{residual}$ = 71,3 mm Functional qualities and links with hardware are reserved	P = 350 N Functional qualities of the window and links with hardware to be reserved
*	Detailed test results are given in Annex 4 of the test report.				

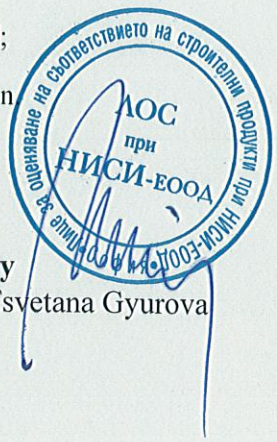
1	*2*	*3*	*4*	*5*	*6*
4	Airborne sound insulation – weighted sound reduction index, R_w (C; C_{tr}) *	dB	EN ISO 10140-2	40 (-1; -4)**	-
* Weighted sound reduction index, Rw (C; Ctr) dB, according to EN ISO 717-1. ** Detailed test results are given in Annex 5 of the test report.					
5	Thermal transmittance coefficient: - the profile - the insulating glass unit - the window	W/(m^2.K)	EN ISO 10077-1	 1,51 0,66 0,83	 - - -
6	Air permeability *	class	EN 1026	4	EN 12207 The requirements are given at Annex 6 of the test report.
* Detailed test results are given in Annex 6 of the test report.					

Technical documentation:

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;
EN 1027:2003	Windows and doors. Watertightness. Test method;
EN 12208: 2003	Windows and doors. Watertightness. Classification;
EN 12211:2003	Windows and doors. Resistance to wind load. Test method;
EN 12210:2003	Windows and doors. Resistance to wind load. Classification;
EN 14609:2005	Windows. Determination of the resistance to static torsion;
EN 13115:2004	Windows. Classification of mechanical properties. Racking, torsion and operating forces;
EN ISO 10140-2:2010	Acoustics. Laboratory measurements of sound insulation of building elements. Part 2: Measurement of airborne sound insulation.;
EN ISO 717-1:2013	Acoustics. Rating of sound insulation in buildings and of building elements. Part 1: Airborne sound insulation;
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
EN 1026:2003	Windows and doors. Air permeability. Test method;
EN 12207:2003	Windows and doors. Air permeability. Classification

Tests are carried out by:
1. Eng. O. Savov
2. Res. Ass. Eng. K. Glushkova

Head of Test Laboratory
Res. Ass. Eng. Tsvetana Gyurova



Annex 1

Data of window for testing

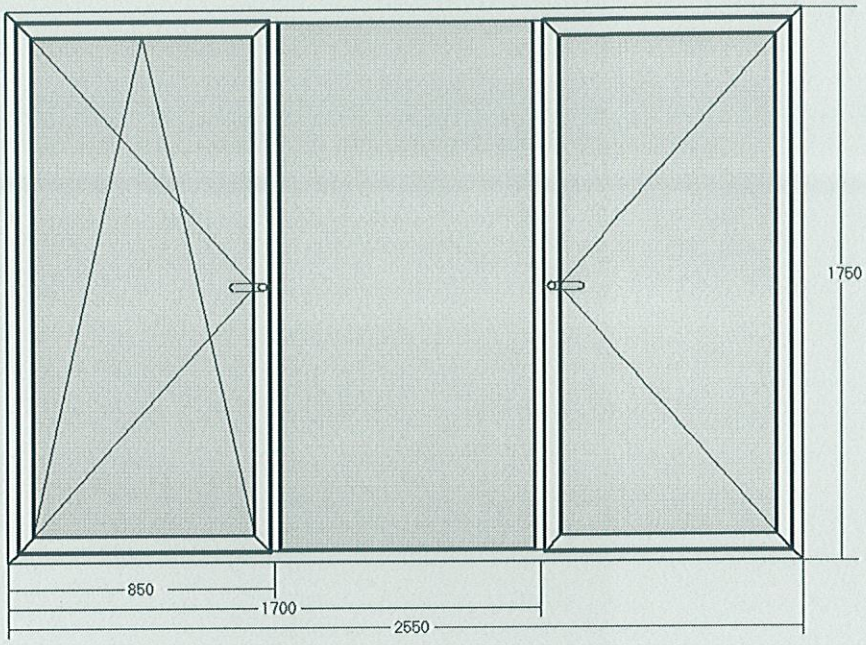
Name of product: Window aluminum profiles „VIVA ALUMINIUM SYSTEMS“ Opening system with thermal break TBO 70

Description of test specimen: Three section window with right wing - biaxial opening; middle part – no opening, left wing - uniaxial opening:

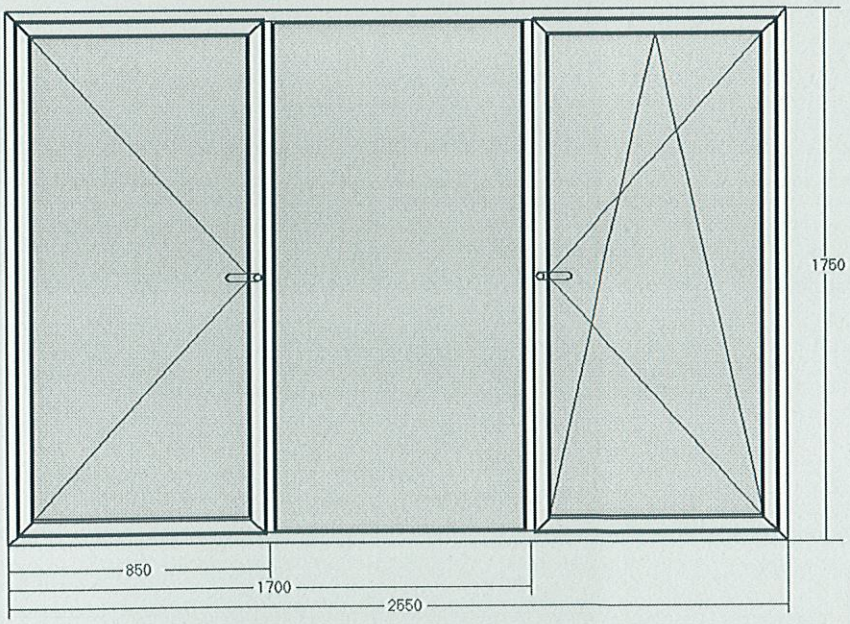
- dimensions 1750/2550 mm;
- Glazing – glass with a total thickness of 48 mm (4 mm high energy glass, 18 mm air gap filled with 90% Argon, 5 mm white glass; 20 mm air gap, filled with 90% Argon, triplex niskoemisien);
- Used Al profiles:
  - Fund - 7001;
  - Wing - 7003;
  - divider -7005;
  - glazing - 3816;
- Seals:
  - G01 - waiting tire;
  - GO2 - ramming rubber;
  - G03 - rubber tube;
  - G08 - medium tire THERMO;
- Hardware - "GEU".

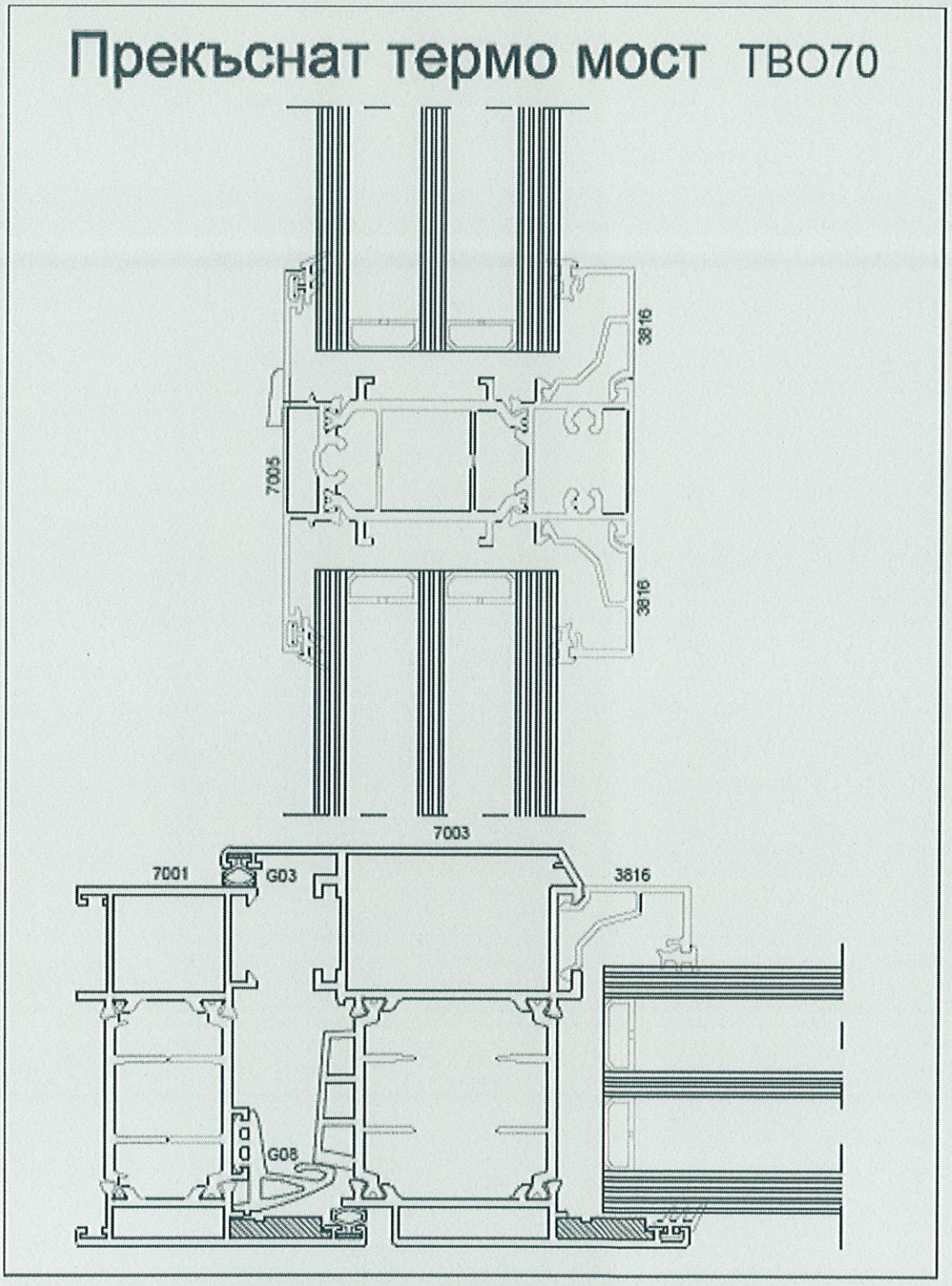
Note: Detailed drawings of the test specimen are shown on p. 6 and p. 7.

OUTSIDE



INSIDE




Прекъснат термо мост ТВО70
3816
7005
3816
7003
7001
G03
3816
G08

Annex 2

Watertightness – EN 1027

1. Test conditions and test equipment data

The test is carried out on a stand system "Rosenheim" type "VH AE" of HOLTEN located in the Laboratory "Building Physics" at NISI Ltd. The stand consists of a chamber and control and measurement desk. The chamber is airtight and only one of the sides is open. This side is closed by appropriate fixing of testing window that is oriented to the outside of the chamber.

The testing window is fixed to the spacers (the chamber sides) by manual clamps. Microporous rubber seals are used between the window frame and the chamber walls for good seal.

Water quantity – 2 dm^3 per 1 m^2/min.
Air temperature in the chamber and the laboratory is 18 °C.
Relative humidity in the chamber and the laboratory is 65 %.

2. Test results

Test pressure, Pa	Continuance, min	Results of the monitoring on the internal face of the test specimen	Classification	Requirements according to EN 12208
0	15	Water resistant	1A	Water resistan at water spray for 15 min
50	5	Water resistant	2A	As class 1A + 5 min
100	5	Water resistant	3A	As class 2A + 5 min
150	5	Leaking from the inner corners of the wings below (left and right)	4A	As class 3A + 5 min

Annex 3

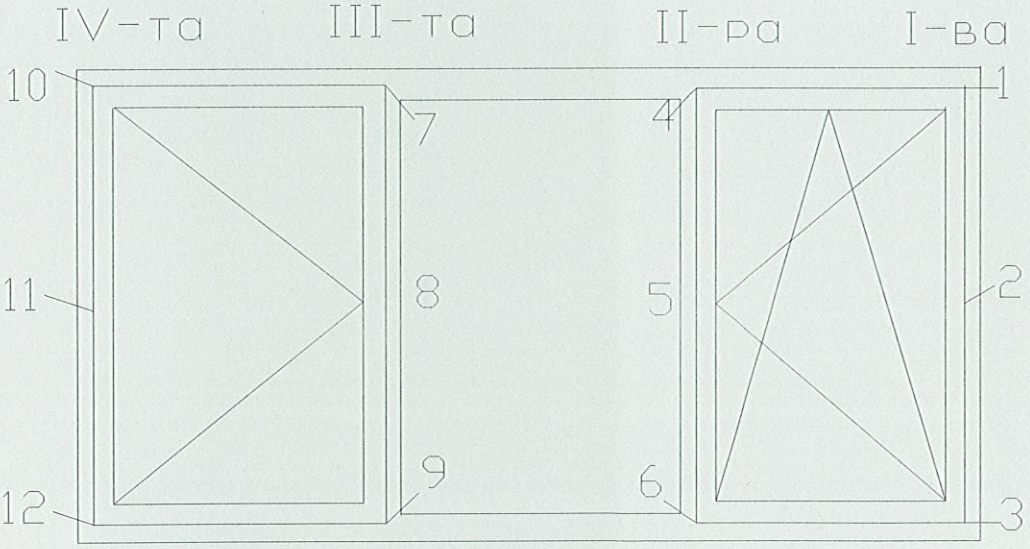
Resistance to wind load – БДС EN 12211

1. Test conditions and equipment data

The test equipment and the chamber are in accordance with Annex 2 of the test report.
Air temperature in the chamber and the laboratory is 15 °C.
Relative humidity in the chamber and the laboratory is 68 %.

2. Testing of deformation (deflections)

Measurement of deformations (deflections) of the linear elements in height of the window wings is made using measuring devices type TGL 7682 accurate to 0,01 mm (produced of SUHL, Germany).



Disposition scheme of measuring points on the window

Test pressure, Pa	Deflection in mm		
	I-st vertical axis		
	f_p ($f_{p\,res}$*) at p.1	f_p ($f_{p\,res.}$) в т.2	f_p ($f_{p\,res.}$) в т.3
+400 / -400	+0,00 / -0,06 (0,00 / -0,02)	+0,07 / -0,11 (0,00 / -0,04)	+0,05 / -0,04 (+0,01/ 0,00)
+800 / -800	+0,01 / -0,07 (+0,02/-0,03)	+0,33 / -0,29 (+0,05/-0,08)	+0,12 / -0,11 (+0,03/-0,02)
	II-st vertical axis		
	f_p ($f_{p\,res.}$) at p.4	f_p ($f_{p\,res.}$) at p.5	f_p ($f_{p\,res.}$) в т.6
+400 / -400	+0,41 / -0,36 (+0,06/-0,06)	+1,22 / -1,20 (+0,25/-0,22)	+0,62 / -0,57 (+0,09/-0,08)
+800 / -800	+1,00 / -0,88 (+0,12/-0,14)	+2,79 / -2,59 (+0,28/-0,33)	+1,34 / -1,36 (+0,16/-0,21)
	III-st vertical axis		
	f_p ($f_{p\,res.}$) at p.7	f_p ($f_{ocr.}$) at p.8	f_p ($f_{ocr.}$) at p.9
+400 / -400	+0,56 / -0,56 (+0,04/-0,07)	+1,32 / -1,13 (+0,26/-0,14)	+0,47 / -0,43 (+0,07/-0,06)
+800 / -800	+1,12 / -1,30 (+0,11/-0,15)	+2,64 / -2,56 (+0,27/-0,37)	+0,93 / -1,14 (+0,06/-0,19)
	IV-st vertical axis		
	f_p ($f_{p\,res.}$) at p.10	f_p ($f_{p\,res.}$) at p.11	f_p ($f_{p\,res.}$) at p.12
+400 / -400	0,00 / -0,03 (0,00/-0,01)	+0,21 / -0,19 (+0,08/-0,07)	0,00 / -0,08 (0,00/-0,03)
+800 / -800	+ 0,02 / -0,08 (0,00 /-0,04)	+0,50 / -0,48 (+0,07/-0,15)	+0,05 / -0,16 (+0,01/-0,09)

* $f_{p\,res}$ is residual deflection.

3. Repeated pressure test

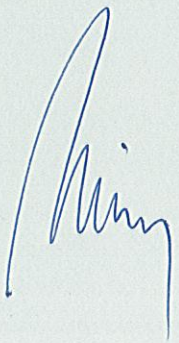
The test is implemented at a pressure of ± 400 Pa, repeated 50 times.

At the repeated 50 cycles test including negative and positive pressure of 400 Pa, that simulate the window behavior at the wind blows (pressure and suction) defects and damages that deteriorate the window performance are not detected.

4. Safety test at triple pressure

The test is carried out at positive and negative pressure ± 1200 Pa only once.

Damages that deteriorate the window performance are not detected during the safety test at triple pressure.



Annex 4

Load-bearing capacity devices – БДС EN 14609

1. Test equipment data

Deformations of the linear elements of the wings are measured by inductive displacement sensors type TS 50 W accurate to 0,01 mm and amplifier of carrier frequency KWS 673 A4 (produced of HBM, Germany).

2. Test results

2.1 Bending load with a horizontal force F, in N, for 5 min, applied to one side of the wing hinges, rotating on a horizontal axis locked at the other end.

F = 20 N: a_o = 1,2 mm

F = 200 N: a_l = 41,1 mm; $a_r = a_l - a_o$ = 39,9 mm; $a_{ост.}$ = 6,0 mm

F = 250 N: a_l = 53,2 mm; $a_r = a_l - a_o$ = 52,0 mm; $a_{ост.}$ = 11,3 mm

F = 300 N: a_l = 63,7 mm; $a_r = a_l - a_o$ = 62,5 mm; $a_{ост.}$ = 12,5 mm

F = 350 N: a_l = 72,5 mm; $a_r = a_l - a_o$ = 71,3 mm; $a_{ост.}$ = 13,4 mm

Functional qualities and links with overlaid are reserved.

2.2 Bending load with a horizontal force F, in N, for 5 min, applied to the bottom of the wing hinges, rotating on a vertical axis locked at the top.

F = 20 N: a_o = 1,8 mm

F = 200 N: a_l = 49,6 mm; $a_r = a_l - a_o$ = 47,8 mm; $a_{ост.}$ = 5,8 mm

F = 250 N: a_l = 59,2 mm; $a_r = a_l - a_o$ = 57,4 mm; $a_{ост.}$ = 7,1 mm

F = 300 N: a_l = 70,6 mm; $a_r = a_l - a_o$ = 68,8 mm; $a_{ост.}$ = 8,8 mm

F = 350 N: a_l = 80,2 mm; $a_r = a_l - a_o$ = 78,4 mm; $a_{ост.}$ = 10,3 mm

Functional qualities and links with overlaid are reserved.

Airborne sound insulation – EN ISO 10140-2, EN ISO 717-1

1. Test conditions, test facilities and equipment data

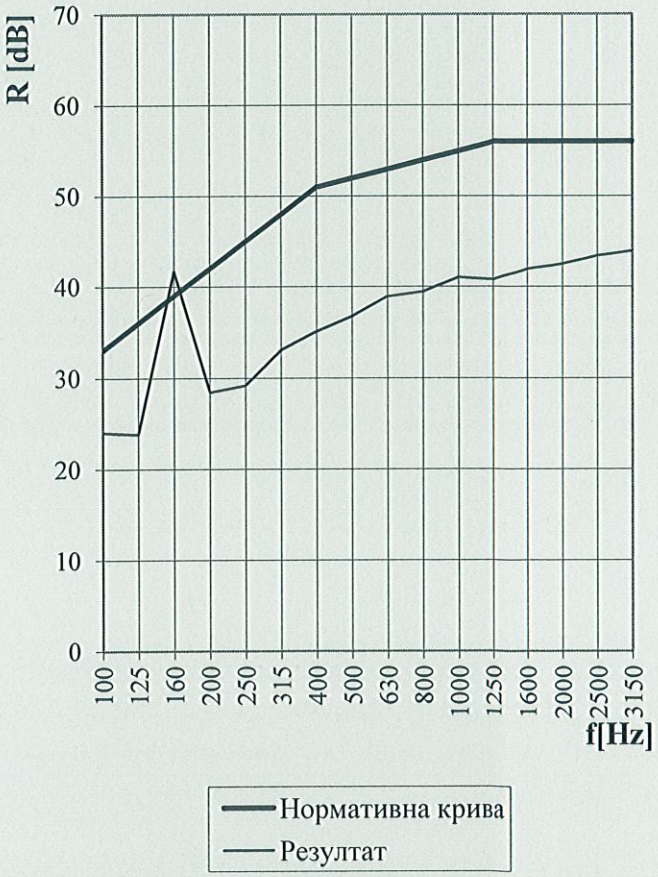
The test is carried out at "Building physics" laboratory:

- Air temperature 24 °C; relative humidity 60 %
- Source room V = 170 m³;
- Receiving room V = 119 m³;;
- Filling wall with Rw = 50 dB;
- Acoustic equipment "Brüel & Kjær" - Denmark:
  - Analyzer for building acoustics Type 4418;
  - Microphone Type 4166;
  - Preamplifier Type 2916;
  - Source noise Type 4292;
  - Sound calibration Type 4230.

The test specimen is installed by the specialists of Applicant.

2. Test results

f, Hz	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150
R, dB	24,0	23,9	41,7	28,5	29,2	33,1	35,1	36,8	38,9	39,5	41,0	40,8	42,0	42,5	43,4	44,0



WEIGHTED SOUND REDUCTION INDEX

Rw (C; C_{tr}) = 40 (-1; -4) dB

Annex 6

Air permeability – EN 1026

1. Test conditions and test equipment data

The test equipment is in accordance with Annex 2 of the test report.

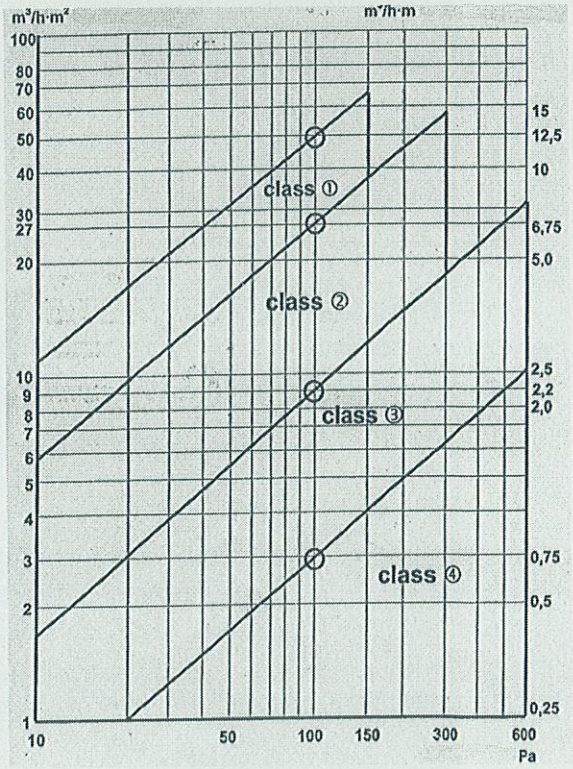
Air temperature in the receiving room is 17 °C.
Relative humidity in the receiving room is 75 %.

2. Test results

Length of opening joints – 9,80 m, overall window area – 4,29 m^2

P, Pa	50	100	150	200	250	300	400	500	600
V, m^3/h	3,3	5,0	6,3	7,5	8,6	10,9	12,3	15,1	17,7
V1, m^3/hm	0,34	0,51	0,64	0,76	0,88	1,11	1,26	1,54	1,81
Vw,m^3/hm^2	0,77	1,17	1,47	1,75	2,00	2,54	2,87	3,52	4,13

Air permeability – classification:
- overall area – class 4;
- length of opening joints – class 4.



Classification