Test Report Summary and Expert Statement

Airborne Sound Insulation of Building Elements

11-000845-PR01
(GAS-PB01-A01-04-en-02)

Client

aluplast GmbH
Kunststoffprofile
Auf der Breit 2

76227 Karlsruhe
Gemany

Product	Single window, single leaf
Designation	IDEAL 4000
Overall dimensions (W x H)	1,230 mm × 1,480 mm
Frame material	PVC profiles with and without steel reinforcement
Type of opening	Tilt and turn
Glazing	Insulating glass unit (IGU)
Frame - structural depth	Frame member: 70 mm
Additional design variants	-

Weighted sound reduction index R_w
Spectrum adaptation terms C and C_{tr}

R_w ($C;C_{tr}$) in dB

*) based on sound insulation tests

ift Rosenheim
09 May 2012

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Basis

EN ISO 140-3 :1995+A1:2004
EN ISO 717-1 : 1996+A1:2006
EN 14351-1: 2006

Test reports referring to windows from System aluplast IDEAL 4000.

This Test Report Summary and Expert Statement is a translation of Test Report Summary and Expert Statement no. 11-000845-PR01 (GAS-PB-01-A01-04-de-02) dated 09 May 2012.

Instructions for use

This expert statement together with the above basis serve to demonstrate the airborne sound insulation of a building element.

As per DIN 4109:1989-11, the following is applicable in Germany:

- R_w corresponds to $R_{w,P}$, $R_{w,R} = R_{w,P} – 2$ dB
- $R_{w,R}$ for Construction Products List (Bauregelliste)

Validity

Testing the airborne sound insulation of a window does not allow any statement to be made on any additional properties relating to performance and quality of the present construction.

Notes on publication

The **ift** Guidance Sheet "Conditions and Guidance for the Use of **ift** Test Reports" applies.

Contents

The report comprises a total of 9 pages.

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Anerkannte PÜZ-Stelle: BAY 18
Deutscher Akkreditierungs Rat
DAP-PL-0808.99
DAP-ZE-2288.00
TGA-ZM-16-93-00
TGA-ZM-16-93-60

1 Contents

2 Basis

The evaluation is based on:

- DIN EN 20140-2:1993-05, "Acoustics; measurement of sound insulation in buildings and of building elements - Part 2: Determination, verification and application of precision data“
- DIN EN ISO 140-3:2005, "Acoustics; measurement of sound insulation in buildings and of building elements - Part 3: Laboratory measurements of airborne sound insulation of building elements“
- DIN EN ISO 10140-2:2010-12, "Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation "
- DIN EN ISO 717-1:1997, "Acoustics; measurement of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation“
- DIN 4109 Addendum 1 / A1 Table 40: 2003:09
- DIN EN 14351-01:2006, "Windows and doors - Product standard, performance characteristics - Part 1: Windows and external pedestrian doors without resistance to fire and/or smoke leakage characteristics"
- Test of airborne sound insulation of windows from Systems IDEAL 4000 of company aluplast according to list of test reports/test evidence given in Section 3, i.e.:

  Test report No. 001127.P14 dated 22 March 2001 referring to sound insulation measurements of System IDEAL 4000 by Labor für Schall- und Wärmemesstechnik commissioned by company aluplast GmbH
  Test reports No. 161 29751 / Z1 R1, Z2 R1, Z3 R1 and / Z5 R1 dated 1 September 2005 referring to sound insulation measurements of System IDEAL 4000 by ift Rosenheim commissioned by company aluplast GmbH
  Test reports No. 161 32941 / Z6-Z7 and Z1-Z10 dated 8 March 2007 referring to sound insulation measurements of System IDEAL 4000 by ift Rosenheim commissioned by company aluplast GmbH
  Test reports No. 161 37413 / Z2, Z3, Z4 and / Z7 dated 16 December 2008 referring to sound insulation measurements of System IDEAL 4000 by ift Rosenheim commissioned by company aluplast GmbH

- Expert statements No. 010424.S21 and S24 dated 29 June 2001 referring to sound insulation measurements of window elements of Systems IDEAL 4000 by Labor für Schall- und Wärmemesstechnik commissioned by company aluplast GmbH
- Bernd Saß "Sound Insulation of triple insulating glass units", Fortschritte der Akustik (Progress in acoustics), NAG/DAGA 2009
- Sound insulation tests of triple insulating glass units, unpublished analyses from the archive of the ift Centre for Acoustics

Notes: The tests used as basis for this test report were conducted in accordance with EN ISO 140-3:1995+A1:2004. Therefore, this test report refers to these test standards. These test standards have now been superseded by the standard series DIN EN ISO 10140 (Parts 1 to 5). According to the two standard series, the test methods are identical.

3 List of test reports

List of test reports

No.	Type	Design, Dimensions, Type of opening	Glazing Gas filling: Argon	R_w of glass in dB	Test result in dB R_w (C;C_{tr})	Evidence of Performance
1.	IDEAL 4000 with steel reinforcement structural depth: 82 mm casement hfv	Single window, single leaf, 1.23 × 1.48, Tilt and turn, 1 external gasket 1 internal gasket	4/16/4	-	33 (-;-)[1]	010424.S24
2.			6/16/4	-	37 (-;-)[1]	010424.S21
3.			10/16/4	-	39 (-2;-5)	001127.P14
4.	IDEAL 4000 with steel reinforcement structural depth: 70 mm casement fv	Single window, single leaf, 1.23 × 1.48, Tilt and turn, 1 external gasket 1 internal gasket	9 LSG SI/16/6	41	42 (-2;-5)	161 29751/Z01 R1
5.			8 LSG TF/16/6	42	42 (-2;-6)	161 29751/Z02 R1
6.			9 LSG SI/16/10	45	44 (-1;-2)	161 29751/Z03 R1
7.			9 LSG SI/16/13 LSG SI	48	45 (-1;-3)	161 29751/Z05 R1
8.	energeto IDEAL 4000 with reinforcement of PBT strips structural depth: 79 mm casement hfv	Single window, single leaf, 1,23 × 1,48, Tilt and turn, 1 external gasket 1 internal gasket	4/16/4	29	33 (-2;-6)	161 37413/Z02
9.			6/16/4	35	38 (-3;-7)	161 37413/Z03
10.			8 LSG SI/16/6	42	41 (-3;-7)	161 37413/Z04
11.			12 LSG SI/20/8 LSG SI	48	45 (-1;-3)	161 37413/Z07

Note: R_w of glass specified by client

[1] For this expert statement only the weighted sound reduction index was specified and not the spectrum adaptation terms.

4 List of variants

4.1 Design - window unit IDEAL 4000

The design covers windows with frame of 70 mm structural depth. The structural depth of the casement member varies with the shape of the profile between 70 mm and 82 mm.

Further characteristics of the windows listed in this Section:

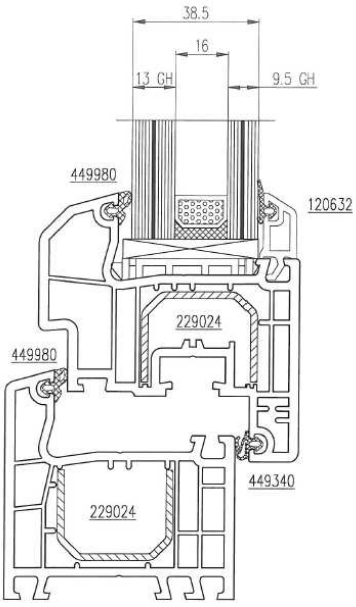
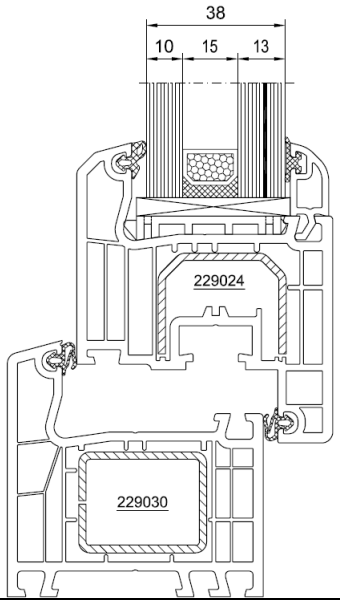
Product	single window, single leaf
Opening direction	opening inwards
Type of opening	tilt and turn
Rebate seals	1 external gasket, 1 internal gasket

The below variants were tested:
Window composed of PVC profiles with steel reinforcement, structural depth of casement member: 70 mm and 82 mm
Window composed of PVC profiles with PBT-reinforcement, structural depth of casement member: 79 mm

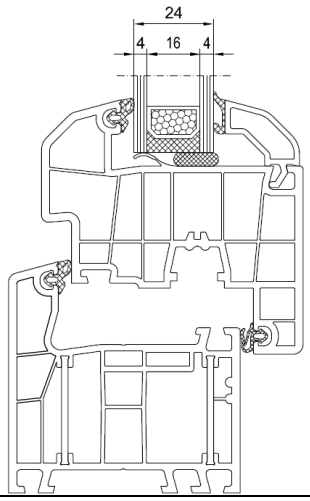
Windows having the IGU glued to the casement member shall be evaluated with respect to the sealant not filling the complete spacing up to the lip. The configuration evaluated in this statement is shown in the table below.

The table below gives an overview of the design.

Design - single window

Type	Variant	Drawing	Maximum glass thickness
IDEAL 4000	PVC profiles with steel reinforcement, structural depth of casement member 82 mm		
IDEAL 4000	PVC profiles with steel reinforcement, structural depth of casement member 70 mm		

Design - single window

Type	Variant	Drawing	Maximum glass thickness
energeto IDEAL 4000	PVC profiles with PBT-reinforcement, structural depth of casement member 79 mm		

4.2 Tested variants

The following lists the weighted sound reduction indices and spectrum adaptation terms for single windows sized 1.23 x 1.48 obtained from sound insulation testing.

	Glass configuration	4/16 Ar/4	6/16 Ar/4	10/16 Ar/4	8 LSG SI/16 Ar/6
	Nominal glass thickness	24 mm	26 mm	34 mm	30 mm
	$R_{w,P,Glas}$	-	35 / 36 dB	39 dB	41 / 42 dB
System		R_w (C;C_{tr}) in dB			
IDEAL 4000	with steel reinforcement, structural depth of casement member 82 mm	33 (-;-)	37 (-;-)	39 (-2;-5)	-
IDEAL 4000	with steel reinforcement, structural depth of casement member 70 mm	-	-	-	42 (-2;-5)
energeto IDEAL 4000	with PBT-reinforcement, structural depth of casement member 79 mm	33 (-2;-6)	38 (-3;-7)	-	41 (-3;-7)

	Glass configuration	10/16 Ar/ 9 LSG SI	13 LSG SI/16 Ar/ 9 LSG SI	12 LSG SI/20 Ar/ 8 LSG SI
	Nominal glass thickness	30 mm	38 mm	42 mm
	$R_{w,P,Glas}$	45 dB	48 dB	48 dB
System		R_w (C;C_{tr}) in dB		
IDEAL 4000	with steel reinforcement, structural depth of casement member 70 mm	44 (-1;-2)	45 (-1;-3)	-
energeto IDEAL 4000	with PBT-reinforcement, structural depth of casement member 79 mm	-	-	45 (-1;-3)

5 Expert evaluation

5.1 Evaluation

The test results listed in Section 4.2 are to be extrapolated for windows with triple insulating glass units. For ensuring correctness of this extrapolation, the sound reduction index $R_{w,P,Glas}$ of the triple insulating glass units must be at least the same as that of the tested double insulating glass units. Evaluation of triple insulating glass units has shown that sound insulation of glazing $R_{w,P,Glas}$ is the same as or better than that of double insulating glass units, provided that the external panes are the same. Therefore the test results listed in Section 4.2 can be applied without any deduction to the window combinations listed below.

The result of the expert evaluation for the window configuration having the IGU glued to the casement member with the sealant not filling the complete spacing up to the lip, was that no change in sound insulation is expected to occur within the general uncertainties of measurement.

Apart from glazing, it is prerequisite for application/extrapolation of these findings that the evaluated window units are the same as those tested; this applies in particular to the dimensions of frame/casement members, profile cross sections, rebate seals and hardware/fittings. For triple insulation glass units the configurations of the external panes must be identical with the variants tested (glass thickness, type and thickness of interlayer/film).

5.2 Result of expert evaluation

	Glass configuration	4/12/4/12/4	6/12/4/12/4	10/12/4/12/4	8 LSG SI /12/4/12/6
	Gas filling	Argon each			
	Nominal glass thickness	36 mm	38 mm	42 mm	42 mm
System		R_w (C;C_{tr}) in dB			
IDEAL 4000	with steel reinforcement, structural depth of casement member 82 mm	33 (-;-)	37 (-;-)	39 (-2;-5)	-
IDEAL 4000	with steel reinforcement, structural depth of casement member 70 mm	-	-	-	42 (-2;-5)
energeto IDEAL 4000	with PBT-reinforcement, structural depth of casement member 79 mm	33 (-2;-6)	38 (-3;-7)	-	41 (-3;-7)

	Glass configuration	10/12/4/12/ 9 LSG SI	13 LSG SI/12/4/ 12/9 LSG SI	12 LSG SI/12/4/12/ 8 LSG SI
	Gas filling	Argon each		
	Nominal glass thick-ness	47 mm	50 mm	48 mm
System		R_w (C;C_{tr}) in dB		
IDEAL 4000	with steel reinforce-ment, structural depth of casement member: 70 mm	44 (-1;-2)	45 (-1;-3)	-
energeto IDEAL 4000	with PBT-reinforcement, struc-tural depth of case-ment member 79 mm	-	-	45 (-1;-3)

6 Result and statement

Based on the test results listed in Section 3 and the expert evaluation contained in Section 5.1, conformity with the characteristics listed in Section 4.2 and 5.2 is achieved.

For the specified sound reduction indices the acoustic inaccuracies as set out by DIN EN 20140-2, must be taken into account. Prerequisite for conformity with the values is that the quality of the material used as well as the manufacture and assembly/installation of the units are the same as tested.