

Evidence of performance

Airborne sound insulation of building components

Test Report

No. 16-004099-PR01
(PB Z04-A01-04-en-01)



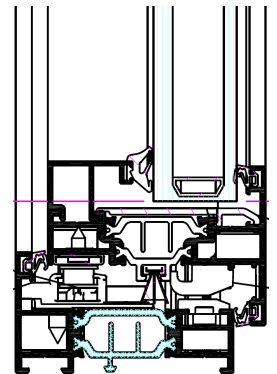
Client **Reynaers Aluminium N.V./S.A.**
Oude Liersbaan 266
2570 Duffel
Belgium

Basis

EN ISO 10140-1: 2016
EN ISO 10140-2 : 2010
EN ISO 717-1 : 2013

Product	Single window, single leaf
Designation	SL68
Overall dimensions (w x h)	1,230 mm x 1,480 mm
Material	Aluminium profile with thermal break
Type of opening	Sliding projecting top hung / horizontal pivot casement
Rebate sealing	External rebate seal, central brush seal, internal rebate seal
Filling	Insulating glass unit, 6Float/16/4Float
Special features	-/-

Representation



Instructions for use

This test report serves to demonstrate the airborne sound insulation of a building component.

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



$$R_w (C; C_{tr}) = 35 (-1; -5) \text{ dB}$$

Validity

The data and results given relate solely to the tested and described specimen.

Testing the sound insulation does not allow any statement to be made on any further characteristics of the present construction regarding performance and quality.

ift Rosenheim
24.01.2017

Notes on publication

The ift Guidance Sheet "Conditions and Guidance for the Use of ift Test Documents" applies. The cover sheet can be used as abstract.

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Contents

The test report contains a total of 11 pages:

- 1 Object
 - 2 Procedure
 - 3 Detailed results
 - 4 Instructions for use
- Data sheet (1 page)

1 Object

1.1 Description of test specimen

Product	Single window, single leaf
Product designation	SL68
Type of opening	Sliding projecting top hung / horizontal pivot casement
Opening direction	Outward opening
Mass of window	54.8 kg
Mass per unit area m ²	30.1 kg/m ²
Frame member	
Frame member size (w x h)	1,230 mm × 1,480 mm
Type	SL68
Material	Aluminium profile with thermal break
Profile number	203.0116.XX
Profile section (w x d)	38 mm × 68 mm
Casement member	
Casement size (w x h)	1,200 mm × 1,450 mm
Type	SL68
Material	Aluminium profile with thermal break
Profile number	203.0492.XX
Profile section (w x d)	50 mm × 68 mm
Rebate configuration	
Rebate drainage	3 notches in frame member profile (30 mm)
Rebate gasket	External rebate seal, central brush seal, internal rebate seal
external (Type / Material / Manufacturer)	180.8204.04 / EPDM / Reynaers Aluminium NV
Position	Casement member
central (Type / Material / Manufacturer)	081.9136.07 / Polypropylene / Reynaers Aluminium NV
Position	Casement member
internal (Type / Material / Manufacturer)	180.8204.04 / EPDM / Reynaers Aluminium NV
Position	Frame member
Pressure compensation/Ventilation	none
Filling	Insulating glass unit
Type, Manufacturer	Semco Phone 36/26, Semco
Visible Size (w x h)	1,100 mm × 1,350 mm
Total Thickness	26 mm
Construction	6Float/16/4Float
Gas filling in cavity	acc. to manufacturer
Type of gas	Argon
Volume in %	> 90%

Sound insulation of filling	$R_{w, \text{Filling}} (C; C_{tr}) = 36 (-1; -5) \text{ dB}$; acc. to manufacturer
Mounting of infill panel	
Sealing system	Dry glazing with sealing gaskets on inside and outside
Internal: Type / Material / Manufacturer	080.9124.04 / EPDM / Reynaers Aluminium NV
External: Type / Material / Manufacturer	080.9293.04 / EPDM / Reynaers Aluminium NV
Vapour pressure equalization	two holes $\varnothing 5 \text{ mm}$
Glazing beads	
Position internal / external	internal
Type, Manufacturer	203.0600.XX, Reynaers Aluminium NV
Hardware	
Type, Manufacturer	Side Hung, Standard Defender, Securistyle, Mustang Slim Line Reverse Espag Lock, Trojan
Hinges/Pivots	2 Hinges
Locks	top 0, bottom 4, hinge sides 0, plus 3 pull in blocks on top
Closing force	< 10 Nm

The description is based on inspection of the test specimen at **ift** Laboratory for Building Acoustics. Item designations / numbers as well as material specifications were provided by the client.

1.2 Mounting in test rig

Test rig	Window test rig „Z“ with suppressed flanking transmission acc. to EN ISO 10140-5: 2010+A1:2014; the test rig includes a mounting frame with a continuous acoustic break which is sealed in the test opening with closed-cell permanently resilient sealant.
Mounting of test specimen	Test specimen mounted by ift Laboratory for Building Acoustics.
Mounting conditions	Mounting in test opening, connecting joints stuffed with foam and sealed on both sides with plastic sealant.
Mounting position	At the rate of 1/3 to 2/3 in the test opening.
Opening direction	Towards emission room.
Preparation	The window was opened and closed repeatedly.

1.3 Representation of test specimen

The structural details were examined solely on the basis of the characteristics to be classified. The illustrations are based on unchanged documentation provided by the client.



fig 1 Photo(s) of the mounted element, taken by ift Laboratory for Building Acoustics

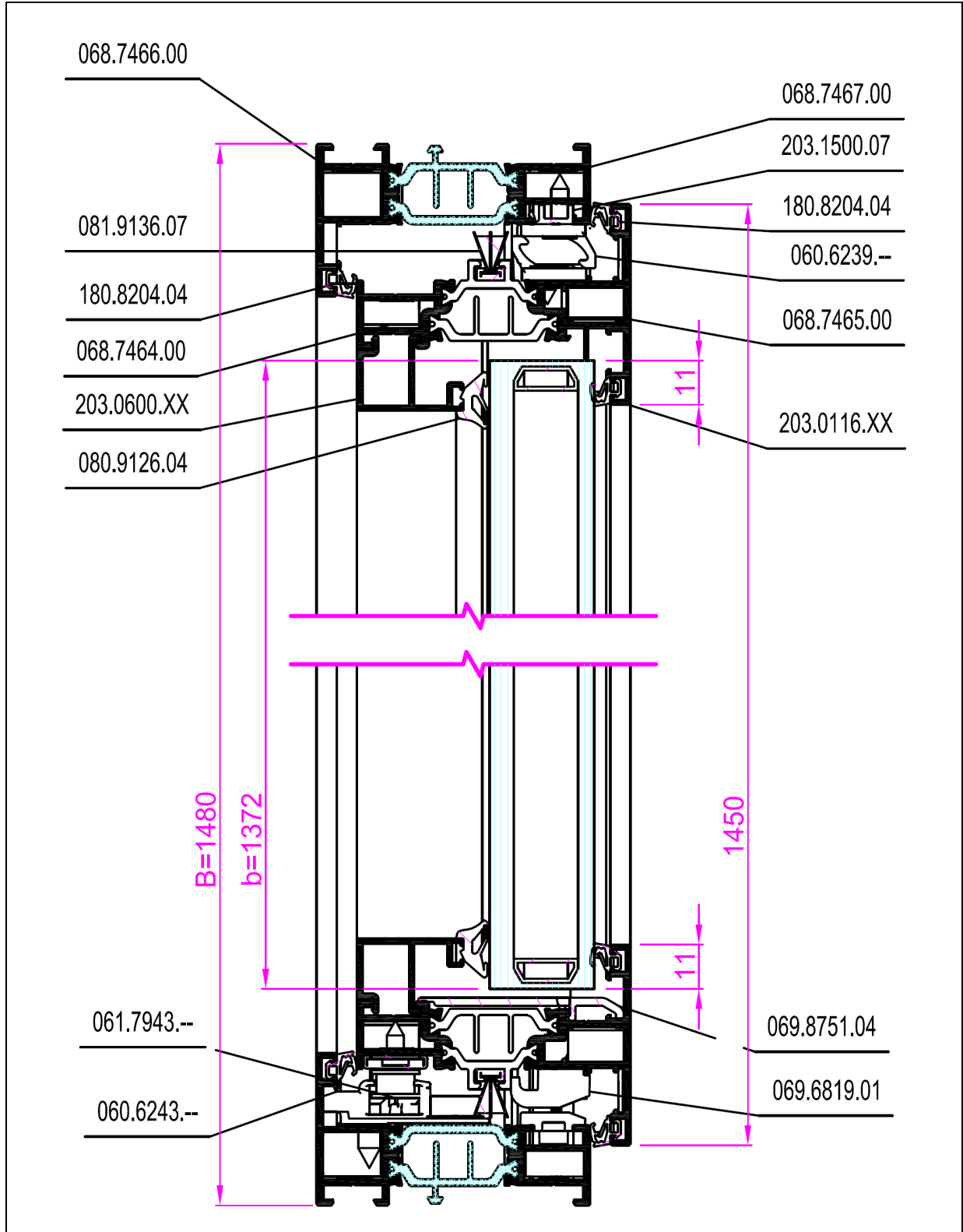


fig 2 vertical cross-section

Airborne sound insulation of building components

Test Report 16-004099-PR01 (PB Z04-A01-04-en-01) dated 24.01.2017

Client Reynaers Aluminium N.V./S.A.; 2570 Duffel (Belgium)

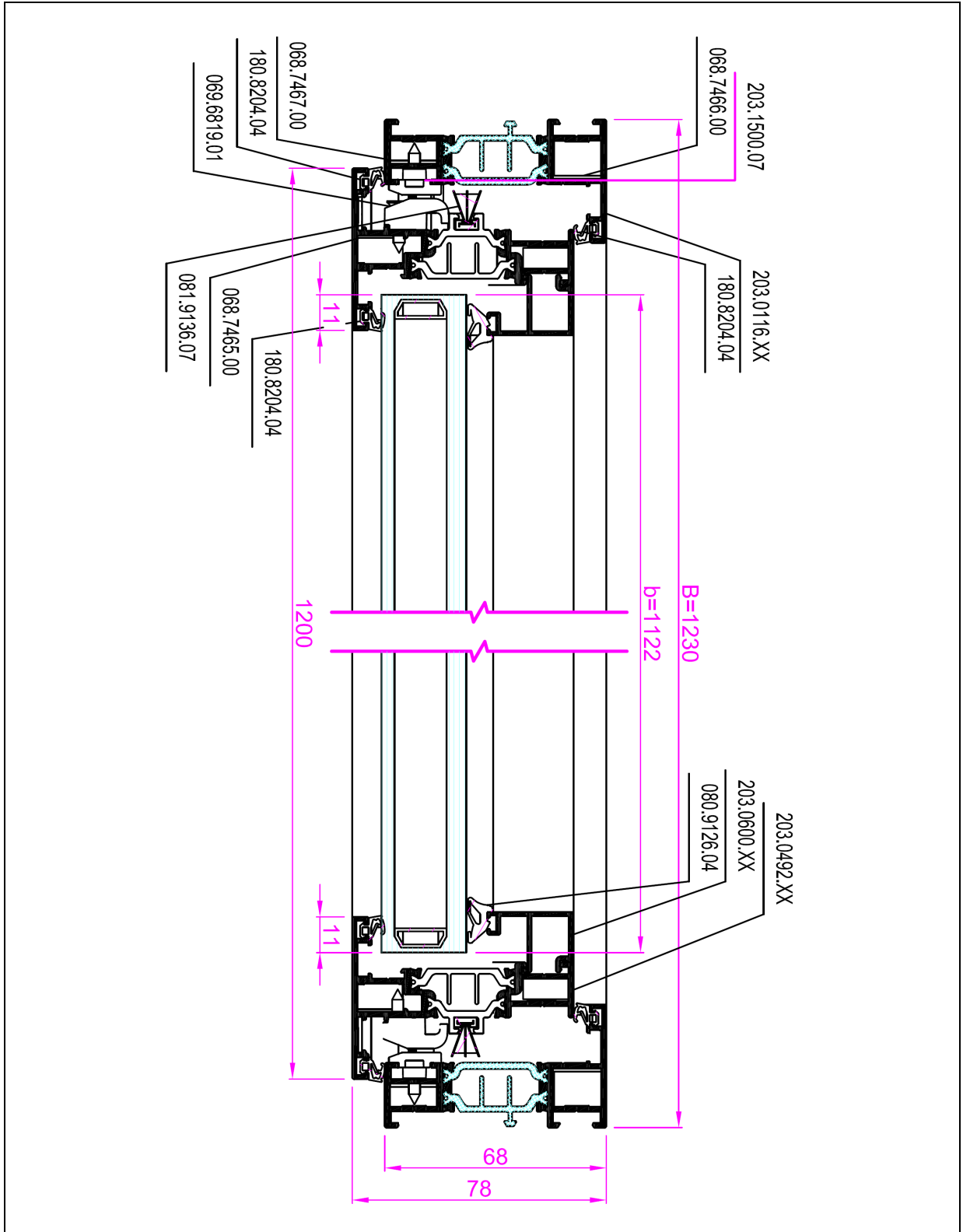


fig 3 horizontal cross-section

2 Procedure

2.1 Sampling

Sampling	The samples were selected by the client
Quantity	1
Manufacturer	Reynaers Aluminium N.V./S.A.
Manufacturing plant	Reynaers Aluminium Test Centre, Duffel (Belgium)
Date of manufacture / date of sampling	7 th of November 2016 1 st of December 2016
Production line	-
Responsible for sampling	Mr. Joris Brusseleers
Delivery at ift	14 th of December 2016 by the client via forwarding agency
ift registration number	42734/03

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2.2 Process

Basis

EN ISO 10140-1: 2016	Acoustics; Laboratory measurement of sound insulation of building elements - Part 1: Application rules for specific products (ISO 10140-1: 2016); German version EN ISO 10140-1:2016
EN ISO 10140-2:2010	Acoustics; Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation (ISO 10140-2:2010)
EN ISO 717-1: 2013	Acoustics; Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation

Corresponds to the national German standard/s:

DIN EN ISO 10140-1: 2016-12, DIN EN ISO 10140-2:2010-12 and DIN EN ISO 717-1 : 2013-06

Procedure and scope of measurement are in conformity with the principles of the Working Group of sound insulation testing bodies approved by the national building supervisory authorities in cooperation with the standardization committee NA 005-55-75-AA (subcommittee UA 1 - DIN 4109).

Boundary conditions	As specified by the standard
Deviation	There are no deviations from the test method/s and/or test conditions.
Test noise	Pink noise
Measuring filter	One-third-octave band filter

Measurement limits

Low frequencies	The dimensions of the receiving room were smaller than recommended for testing in the frequency range from 50 Hz to 80 Hz as per EN ISO 10140-4:2010 Annex A (informative). A moving loudspeaker was used.
Background noise level	The background noise level in the receiving room was determined during measurement and the receiving room level L_2 corrected by calculation as per EN ISO 10140-4: 2010 Clause 4.3.
Maximum sound insulation	The maximum sound insulation of the test set-up was at least 15 dB higher than the measured sound reduction index of the test specimen. Not corrected by calculation.

Measurement of reverberation time

Arithmetical mean: two measurements each of 2 loudspeaker and 3 microphone positions (a total of 12 independent measurements).

Measurement equation A $A = 0,16 \cdot \frac{V}{T} \text{ m}^2$

Measurement of sound level difference

Minimum of 2 loudspeaker positions and rotating microphones.

Measurement equation R $R = L_1 - L_2 + 10 \cdot \lg \frac{S}{A} \text{ dB}$

KEY

A	Equivalent absorption area in m^2
L_1	Sound pressure level source room in dB
L_2	Sound pressure level receiving room in dB
R	Sound reduction index in dB
T	Reverberation time in s
V	Volume of receiving room in m^3
S	Testing area of the specimen in m^2

2.3 Test apparatus

Device	Type	Manufacturer
Integrating sound meter	Type Nortronic 121	Norsonic-Tippkemper
Microphone preamplifiers	Type 1201	Norsonic-Tippkemper
Microphone unit	Type 1220	Norsonic-Tippkemper
Calibrator	Type 1251	Norsonic-Tippkemper
Dodecahedron loudspeakers	Own production	-
Amplifier	Type E120	FG Elektronik
Rotating microphone boom	Own production / Type 231-N-360	Norsonic-Tippkemper

The **ift** Laboratory for Building Acoustics participates in comparative measurements at the Physikalisch-Technische Bundesanstalt (PTB) in Braunschweig every three years, the last one was in April 2016. The sound level meter used, Series No. 31423, was DKD calibrated by the company Norsonic Tippkemper (DKD - Deutscher Kalibrierdienst "German Calibration Service") on 22nd of June 2015.

2.4 Testing

Date 15th of December 2016
Operating Testing Officer Florian Brechleiter

3 Detailed results

The values of the measured sound reduction index of the tested window are plotted as a function of frequency in the annexed data sheet and tabled.

As per EN ISO 717-1 the weighted sound reduction index R_w and the spectrum adaptation terms C and C_{tr} for the frequency range 100 Hz to 3150 Hz obtained by calculation are as follows:

$$R_w (C; C_{tr}) = 35 (-1; -5) \text{ dB}$$

According to EN ISO 717-1 the following additional spectrum adaptation terms are obtained

$C_{50-3,150} = -1 \text{ dB}$	$C_{100-5,000} = 0 \text{ dB}$	$C_{50-5,000} = 0 \text{ dB}$
$C_{tr,50-3,150} = -5 \text{ dB}$	$C_{tr,100-5,000} = -5 \text{ dB}$	$C_{tr,50-5,000} = -5 \text{ dB}$

4 Instructions for use

4.1 Application for DIN 4109: 2016-07

Basis

DIN 4109-1: 2016-07	Sound insulation in buildings - Part 1: Minimum requirements
DIN 4109-2: 2016-07	Sound insulation in buildings - Part 2: Verification of compliance with the requirements by calculation

The weighted sound reduction index determined in accordance with Section 3 can be directly used for verification of sound insulation by calculation in accordance with DIN 4109-2.

For calculation of the total weighted apparent sound reduction index $R'_{w,ges}$ in accordance with DIN 4109-2 Clause 4, the input data obtained from laboratory measurements must be stated in $1/10$ dB. The resulting weighted sound reduction index can then be applied directly to the sound insulation of the i-th-component of the building envelope if there is no influence by installation joints. This gives:

$$R_{i,w} = 35.7 \text{ dB}$$

Note: Unlike the predecessor standard DIN 4109:1989-11, the tolerance is not deducted from the component parameters. The final result of calculation in accordance with DIN 4109-2 takes account of uncertainties by including the safety factor u_{prog} .

4.2 Uncertainty of measurement, single number ratings in $1/10$ dB

Basis

EN ISO 12999-1: 2014 Acoustics; Determination and application of measurement uncertainties in building acoustics, part 1: sound insulation (ISO 12999-1: 2014)

The resulting weighted sound reduction index (in $1/10$ dB with measurement uncertainty), determined on the basis of EN ISO 717-1:2013-06 is:

$$R_w = 35.7 \text{ dB} \pm 1.2 \text{ dB}$$

The specified measurement uncertainty is the average standard deviation of laboratory measurements (standard measurement uncertainty σ_R for measurement situation A: Characterisation of a building component by laboratory measurements as per EN ISO 12999-1: 2014, Table 3 $\sigma_R = 1.2$ dB).

The product declaration for CE marking must use the integral value of the sound reduction index and the spectrum adaptation terms as given in Section 3,

$$R_w (C;C_{tr}) = 35 (-1; -5) \text{ dB}$$

Sound reduction index according to ISO 10140 - 2

Laboratory measurements of airborne sound insulation of building components



Client: Reynaers Aluminium N.V./S.A., 2570 Duffel (Belgium)

Product designation SL68

Design of test specimen

Single window, single leaf

Overall dimensions 1,230 mm × 1,480 mm

Material Aluminium profile with thermal break

Type of opening Sliding projecting top hung / horizontal pivot casement

Rebate seals External rebate seal, central brush seal, internal rebate seal

Locking top 0, bottom 4, hinge sides 0, plus 3 pull in blocks on top

Filling Insulating glass unit

Pane configuration 6Float/16/4Float

Gas filling in cavity Argon

Test date 15th of December 2016

Test surface S 1.25 m × 1.50 m = 1.88 m²

Partition wall Double-leaf concrete wall, insert frame

Test noise pink noise

Volumes of test rooms $V_S = 104 \text{ m}^3$
 $V_R = 67.5 \text{ m}^3$

Maximum sound reduction index $R_{w,max} = 62 \text{ dB}$ (related to test surface)

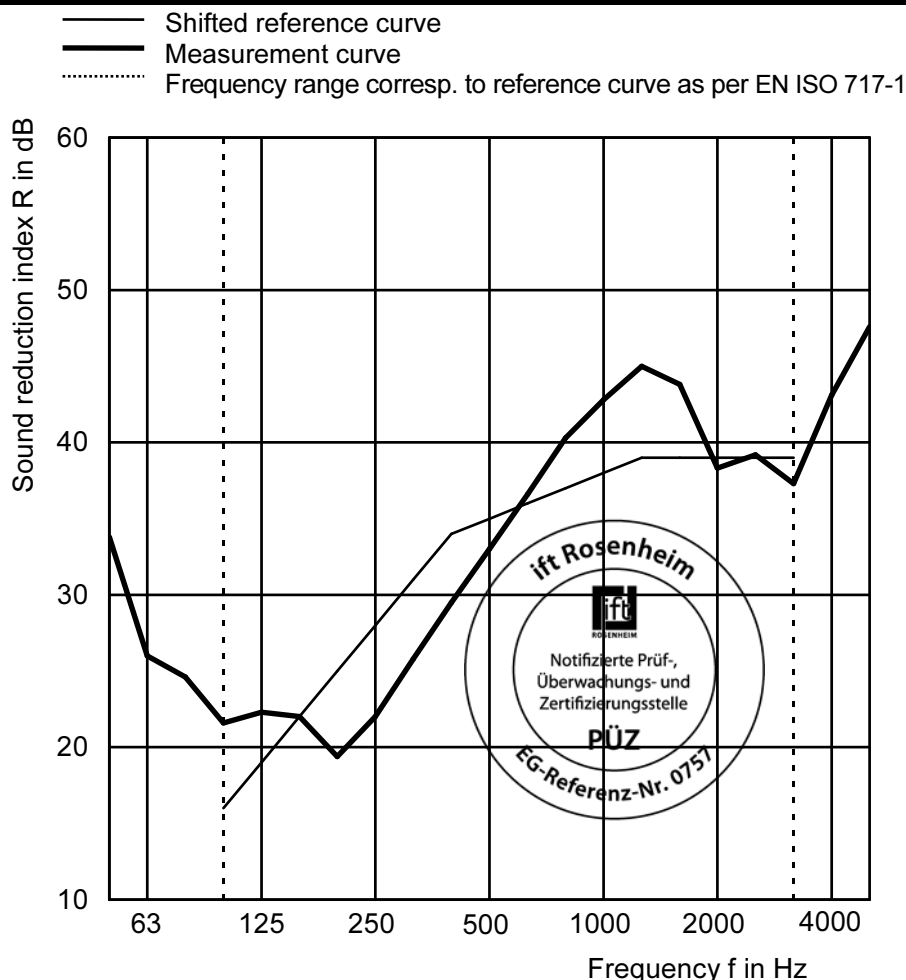
Mounting conditions

Element butt-mounted in test opening and wedged in. Connecting joints filled with foam and sealed with plastic sealant on both sides

Climate in test rooms 20 °C / 35 % RH

Static air pressure 970 hPa

f in Hz	R in dB
50	33.8
63	26.0
80	24.6
100	21.6
125	22.3
160	22.0
200	19.4
250	22.0
315	25.8
400	29.5
500	33.0
630	36.6
800	40.3
1,000	42.8
1,250	45.0
1,600	43.8
2,000	38.3
2,500	39.2
3,150	37.3
4,000	43.1
5,000	47.6



Rating according to EN ISO 717-1 (in third octave bands):

$R_w (C; C_{tr}) = 35 (-1; -5) \text{ dB}$ $C_{50-3,150} = -1 \text{ dB}$; $C_{100-5,000} = 0 \text{ dB}$; $C_{50-5,000} = 0 \text{ dB}$
 $C_{tr,50-3,150} = -5 \text{ dB}$; $C_{tr,100-5,000} = -5 \text{ dB}$; $C_{tr,50-5,000} = -5 \text{ dB}$

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ift Rosenheim

Laboratory for Building Acoustics

24. Januar 2017

Dipl. Ing. (FH) Mr. Florian Brechleier
Operating testing officer