Evidence of performance

Airbourne sound insulation of building elements

Test report
No. 12-003023-PR01
(PB 1-A01-04-en-01)

Client	Arbor Ahsap Yapi Elemanlari Atatürk bulvari Köstemir yolu No:74 Silivri Istanbul Turkey
Product	Single window, one leaf
System designation	MINIMA 68m
External dimension (W x H)	1230 mm × 1480 mm
Material	Aluminium-Softwood (Spruce)
Type of opening	Tilt and Turn
Rebate sealings	1 external, 2 centre, 1 internal
Filling	Insulation glass unit , 17 LSG SC/18/13 LSG SC
Special features	Transport damage at the specimen were repaired

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

$$R_w\ (C;\ C_{tr}) = 43\ (-1;-3)\ \text{dB}$$

ift Rosenheim
12.02.2013

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Basis

EN ISO 10140-1 : 2010
+A1:2012
EN ISO 10140-2 : 2010
EN ISO 717-1 : 1996+A1:2006
12-003023-PR01 (PB-A01-04-de-01) dated 12 february 2013

Representation

Instructions for use

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

Applicable for Germany

- $R_{w,R}$ as DIN 4109: (R_w corresponds $R_{w,P}$, $R_{w,R} = R_{w,P} - 2$ dB)
- $R_{w,R}$ for "Bauregelliste"

Validity

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

Testing the acoustic properties does not allow any statement to be made on further characteristics of the present structure regarding performance and quality.

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.

Contents

This test report contains a total of 8 pages

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Test report 12-003023-PR01 (PB 1-A01-04-en-01) dated 12. Februar 2013
Client Arbor Ahsap Yapi Elemanlari, Istanbul (Turkey)

1 Object

1.1 Description of test specimen

Product	Single window, one leaf
Product designation	MINIMA 68m
Type of opening	Tilt and Turn
Opening direction	towards receiving room
Mass of windows	124.3 kg
Area related mass	68.3 kg/m²
Frame member	
Frame member size (W x H)	1230 mm × 1480 mm
Material	Aluminium-Softwood (Spruce)
Profile number	Uniform LA 882 / wood, further details are given in drawings
Profile section (W x D)	110 mm x 90 mm
Casement member	
Casement member size (W x H)	1142 mm x 1393 mm
Material	wood with plastic glass frame
Profile number	Uniform LP212, further details are given in drawings
Profile section (W x D)	74 mm x 95 mm
Rebate configuration	
Rebate drainage	5 slots in outer shell downward, 30 mm x 5 mm
Rebate sealing	1 external, 2 centre, 1 internal
External	EPDM, Uniform DE 115
(Type / Material / manufacturer)	
Position	on aluminium cover profile, mitred
Centre	EPDM, Uniform DE 126
(Type / Material / manufacturer)	
Position	on frame, continuous, notched in corners, at top centre butt-jointed
Centre	Polypropylen, Schlegel Q-LON 3054
(Type / Material / manufacturer)	
Position	on casement, continuous, notched in corners, at top centre butt-jointed
Internal	Polyurethan, Schlegel Q-LON 3053
(Type / Material / manufacturer)	
Position	on casement, continuous, notched in corners, at top centre butt-jointed
Pressure equalisation	without pressure equalisation.
Filling	Insulation glass unit
Type, manufacturer	Sağlam Cam Tic. San. Ltd. Şti.
Visible size (W x H)	994 mm x 1294 mm
Total thickness in the edge	48 mm

Total thickness in the middle	50 mm
Construction	17 LSG SC/18/13 LSG SC
Gas filling in cavity	according to manufacturer
Type of Gas	Argon
Filling	90 %
Construction of laminated Glass, according to manufacturer	8 mm Float-0.76 mm acoustic foil-8 mm Float / 6 mm Float-0.76 mm acoustic foil-6 mm Float
Type/Manufacturer of interlayer, according to manufacturer	acoustic foil
Mounting of filling	
Sealing system	Seal profiles internal and external
Inside: Type/Material/Manufacturer	EPDM, Uniform DE 133
Outside: Type/Material/Manufacturer	EPDM, Uniform DE 115
Vapour pressure equalization	plastic glass frame downward opened on the left and right side, 19 mm x 25 mm
Fittings	Tilt and turn
Type, Manufacturer	Multi Trend, MACO
Hinges/pivots	1 tilt mechanism pivot, 1 corner pivot
Lockings	at bottom 2, at top 2, on hinge side 2, on lock side 3
Closing force	< 10 Nm

The description is based on inspection of the test specimen at ift laboratory building acoustic. Article designations / numbers as well as material specifications were given by the client.

Particularity: There were found some transport damages during the installation of the test specimen (at the outer shell, the glass sealing, at the plastic glass frame and at the handle). The defects were repaired and internally documented photographically by ift.

1.2 Mounting in test rig

Test rig	Window test rig with suppressed flanking transmission acc. to EN ISO 10140-5: 2010; the test rig includes a 5 cm wide and continuous acoustic break which is sealed in the test opening with elastic sealant.
Mounting of test specimen	Test specimen mounted by **ift** Laboratory for Building Acoustics and employees of the client.
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 receiving room.

Preparation	The window was opened and closed repeatedly. Transport damage at the specimen were repaired.

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 Photos of the mounted element, taken by **ift** Laboratory for Building Acoustics

fig 2 view, vertical cross section, horizontal section

2 Procedure

2.1 Sampling

Sampling	The samples were selected by the client
Quantity	1
Manufacturer	Selectron Elektrokimya San.Ve tic. Ltd şti. Silivri-İST
Date of manufacture	10. January 2013
Responsible for sampling	Mr. Ibrahim Pervan
Delivery at **ift**	Delivery at ift 5. February 2013 by the client via forwarding agency
ift registration number	34053/1

2.2 Process

Basis

EN ISO 10140-1:2010 + A1 : 2012 Acoustics; Laboratory measurement of sound insulation of building elements - Part 1: Application rules for specific products (ISO 10140-1:2010+Amd.1:2012)

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: 1996 + A1:2006 Acoustics; Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation

Corresponds to national German standard:

DIN EN ISO 10140-1:2012-05, DIN EN ISO 10140-2:2010-12 und DIN EN ISO 717-1 : 2006-11

The processing and volume of the test is according to the principles of the "Arbeitskreis der bauaufsichtlich anerkannten Schallprüfstellen" in agreement with NA 005-55-75-AA (UA 1 to DIN 4109).

Boundary conditions	As required in the standard.
Deviation	There are no deviations from the test procedure 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 complies with the requirements of the minimum size 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 10140-4: 2010 Clause 4.3.
Maximum sound insulation	The Maximum sound insulation of the test rig is 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 (total of 12 independent measurements).
Measurement equation A	$A = 0{,}16 \cdot \frac{V}{T}$ m²
Measurement of sound level difference	Minimum of 2 loudspeaker positions and rotating microphones.

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

LEGEND
A equivalent absorption area in m²
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 m³
S Testing area of the specimen in m²

2.3 Test equipment

Device	Type	Manufacturer
Integrating sound meter	Type Nortronic 840	Norsonic-Tippkemper
Microphone preamplifiers	Type 1201	Norsonic-Tippkemper
Microphone units	Type 1220	Norsonic-Tippkemper
Calibrator	Type 1251	Norsonic-Tippkemper
Dodecahedron loudspeakers	Type 229, 96 Ohm	Norsonic-Tippkemper
Amplifier	Type 235, 100 W	Norsonic-Tippkemper
Rotating microphone boom	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 2010. The sound level meter used, Series N. 24842, was calibrated by the Dortmund Eichamt (calibration agency) on 20. January 2011. The calibration is valid until 31. December 2013.

2.4 Testing

Date	7. February 2013
Test engineer	Bernd Saß

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}) = 43 (-1;-3) dB

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

$C_{50\text{-}3150}$ =	-1 dB	$C_{100\text{-}5000}$ =	0 dB	$C_{50\text{-}5000}$ =	0 dB
$C_{tr,50\text{-}3150}$ =	-4 dB	$C_{tr,100\text{-}5000}$ =	-3 dB	$C_{tr,50\text{-}5000}$ =	-4 dB

4 Instruction for use

4.1 Safety margin according to DIN 4109

Basis
DIN 4109:1989-11 Sound insulation in buildings, requirements and verifications

For verification of sound insulation according to DIN 4109: 1989-11 (Suitability Test I) the weighted sound reduction index R_w corresponds to the test value $R_{w,P}$. Including safety margin of 2 dB, the following value $R_{w,R}$ is obtained by calculation

$R_{w,R}$ = 41 dB

4.2 Laminated glass

The sound reduction of laminated glass depends on the temperature of the environment. If the temperature is lower than the test temperature the sound reduction index may be reduced.

4.3 Test standards

The standard series EN ISO 10140:2010 supersedes those, until the respective date, applicable parts of the standards series EN ISO 140 which describe laboratory tests. According to the two standard series, the test methods are identical.

ift Rosenheim
Laboratory for Building Acoustics
12. Februar 2013

Sound reduction index according to ISO 10140 - 2

Laboratory measurements of airborne sound insulation of building elements

Client: Arbor Ahsap Yapi Elemanlari, Istanbul (Turkey)

Product designation MINIMA 68m

ift ROSENHEIM

Design of test specimen

Single window, one leaf

External dimension	1230 mm × 1480 mm
Material	Aluminium-Softwood (Spruce)
Type of opening	Tilt and Turn
Rebate seals	1 external, 2 centre, 1 internal
Lockings	at bottom 2, at top 2, on hinge side 2, on lock side 3
Infill panel	Insulation glass unit
Pane configuration	17 LSG SC/18/13 LSG SC
Gas filling in cavity	Argon

Test date	7. February 2013
Test surface S	1.25 m × 1.50 m = 1.88 m^2
Test rig	as per EN ISO 10140-5
Partition wall	Double-leaf concrete wall
Test noise	pink noise
Volumes of test rooms	V_S = 109.9 m^3
	V_E = 101.3 m^3

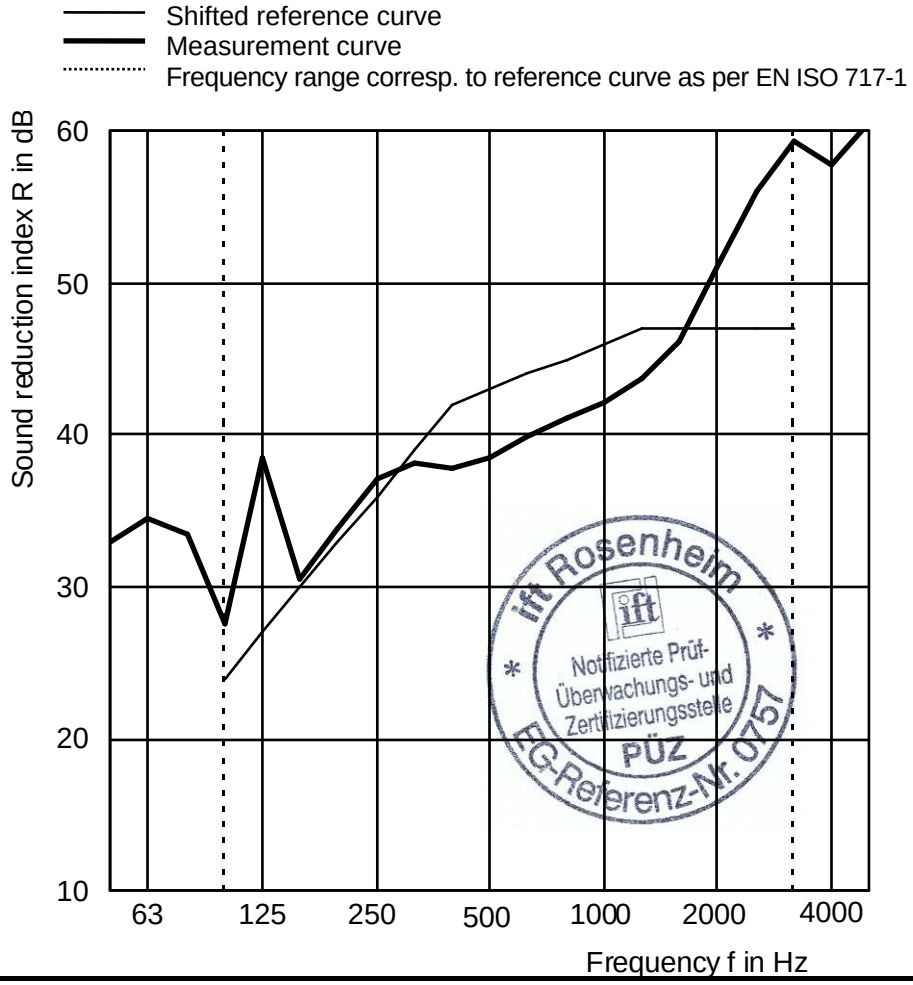
Maximum sound reduction index
$R_{w,max}$ = 62 dB (related to test surface)

Mounting conditions
Window butt-mounted in test opening. Connecting joints filled with foam and sealed with plastic sealant on both sides

Climate in test rooms 20 °C / 43 % RF

Static air pressure 950 hPa

f in Hz	R in dB
50	32.9
63	34.5
80	33.5
100	27.6
125	38.6
160	30.5
200	33.9
250	37.2
315	38.2
400	37.9
500	38.5
630	39.9
800	41.1
1000	42.2
1250	43.7
1600	46.2
2000	51.1
2500	56.0
3150	59.4
4000	57.8
5000	60.6



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

R_w (C;C_{tr}) = 43 (-1;-3) dB $C_{50\text{-}3150}$ = -1 dB; $C_{100\text{-}5000}$ = 0 dB; $C_{50\text{-}5000}$ = 0 dB

$C_{tr,50\text{-}3150}$ = -4 dB; $C_{tr,100\text{-}5000}$ = -3 dB; $C_{tr,50\text{-}5000}$ = -4 dB

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