Evidence of Performance

Airborne sound insulation of building elements

Test report 10-000762-PB01-A01-04-en

Translation of Test report no. 10-000762-PB01-A01-04-de
dated 23 September 2010

ROSENHEIM

Client **Arbor Ahsap Yapi Elemanlari**
Atatürk bulvari Köstemir yolu No:74 Silivri

Istanbul
Türkey

Product	Single-leaf single window
System designation	IV 68
External Dimensions (W x H)	1,230 mm × 1,480 mm
Material	Wood / Meranti
Type of opening	Tilt and turn
Rebate seals	1 central seal, 1 overlap seal
Infill panel	Insulating glass unit, 8 LG/16/12 LG
Special features	-/-

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

$$R_w\ (C;\ C_{tr}) = 42\ (-1;-3)\ \text{dB}$$

ift Rosenheim
21. Oktober 2010

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Basis

EN ISO 140-1 : 1997+A1:2004
EN ISO 140-3 : 1995+A1:2004
EN ISO 717-1 : 1996+A1:2006

Representation

Instructions for use

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

Applicable for Germany:

- $R_{w,R}$ as per DIN 4109: (R_w corresponds to $R_{w,P}$, $R_{w,R} = R_{w,P} - 5$ dB)
- $R_{w,R}$ for "Bauregelliste"

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 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

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für Eignungs- und Güteprüfung DIN 4109

1 Object

1.1 Description of test specimen

Product	Single-leaf single window
Product designation	IV 68
Type of opening	Tilt and turn
Opening direction	To the inside
Mass of the window	85.5 kg
Area related mass	47.0 kg/m²
Frame member	
Frame member size (W x H)	1,230 mm × 1,480 mm
Type	IV 68
Material	Wood / Meranti
Profile section (W x T)	79 mm x 68 mm
Casement member	
Casement member size (W x H)	1,152 mm x 1,386 mm
Type	IV 68
Material	Wood / Meranti
Profile section (W x T)	78 mm x 68 mm
Rebate design	
Rebate drainage	Drainage channel with end caps
Rebate seal	1 central seal, 1 overlap seal
centre	Type SP103A / EPDM / Deventer
(type / material / manufacturer)	
Position	in casement member
inside	Type SP125 / EPDM / Deventer
(type / material / manufacturer)	
Position	in casement member
Infill panel	Insulating glass unit
Type/ manufacturer	Selectron ElektroKimya / Star Grup
Visible size (W x H)	993 mm x 1,227 mm
Total thickness at edge	37 mm
Total thickness in pane centre	37 mm
Configuration	8 LG/16/12 LG
Gas filling in cavity	
Gas	Argon according to Analysis at ift
Volume in %	99%
Configuration of laminated glass	4 mm Float-0.76 mm acoustic film-4 mm Float 6 mm Float-1.14 mm acoustic film-6 mm Float
Type of interlayer	Acoustic film
Mounting of infill panels	
Sealing system	with elastic sealant, exterior and interior without glazing tape

Vapour pressure equalization	Two slots each bottom and top, 12 mm x 8 mm
Glazing beads	
Position interior / exterior	interior
Type/ manufacturer	Wood profile strips / Arbor Ahsap Yapi Elemanlari
Hardware	
Type/ manufacturer	Tilt and turn / Maco
Hinges / pivots	1 hinge 1 pivot
Lockings	at top 0, at bottom 1, on hinge side 1, on lock side 3
Closing force	< 10 Nm

The description is based on inspection of the test specimen at **ift** Centre for Acoustics. Article designations / numbers as well as material specifications were given by the client. (Additional data provided by the client are marked with *)).

1.2 Mounting in test rig

Test rig	Test rig "Z-Wall" with suppressed flanking transmission acc. to EN ISO 140-1; the test rig includes a mounting frame with a 5 cm continuous acoustic break which is sealed in the test opening with plastic sealant.
Mounting of specimen	Specimen mounted by **ift** Centre for Acoustics.
Mounting conditions	Mounting in test opening, connecting joints stuffed with foam and sealed on both sides by application of plastic sealant
Mounting position	Ratio 1/3 to 2/3 in test opening.
Opening direction	Towards receiving room.
Preparation	The window was opened and closed repeatedly.

1.3 Representation of the 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 Photography of the mounted element, taken by **ift** Centre for Acoustics

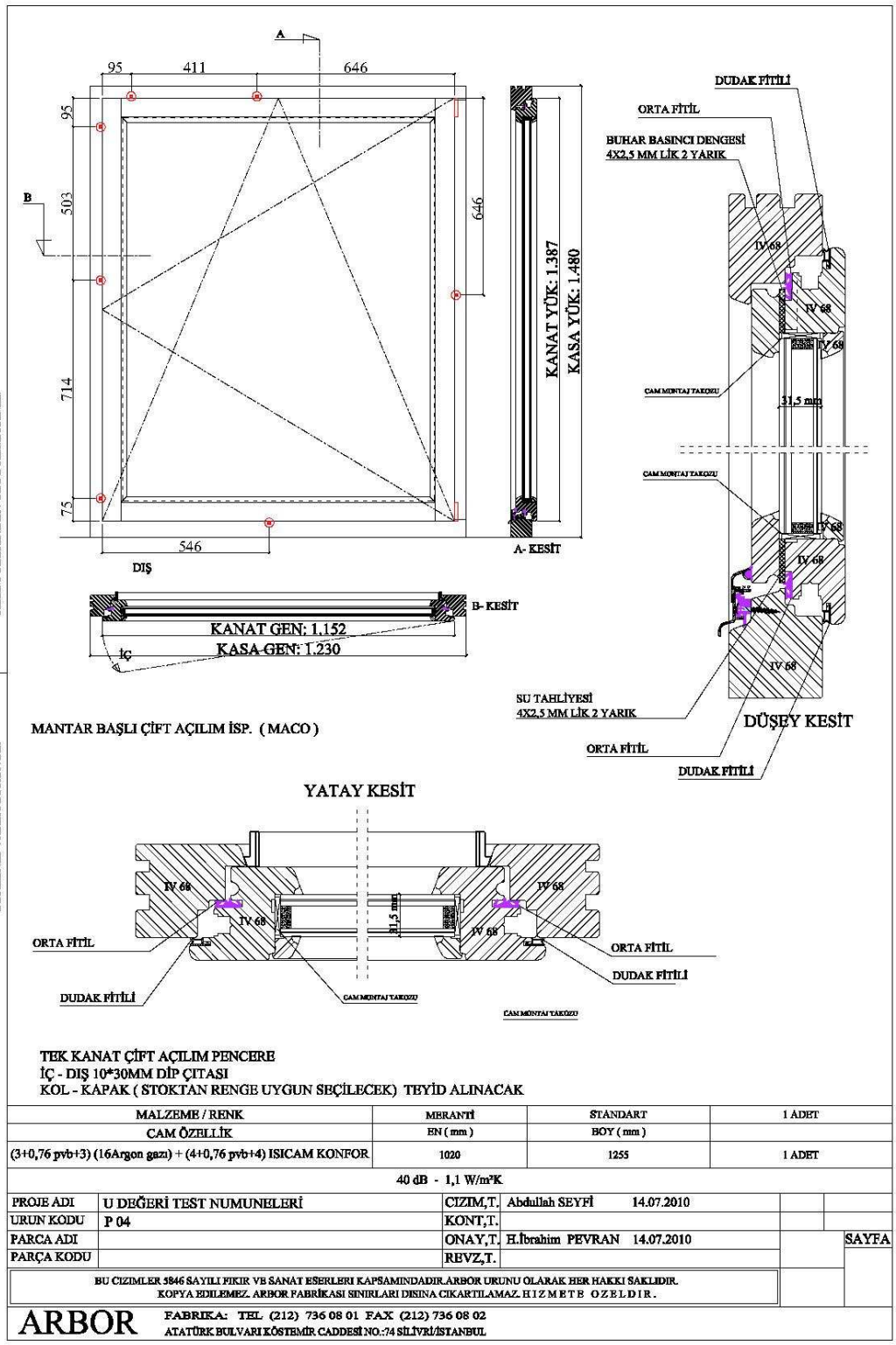


Fig. 2 View, horizontal and vertical section. The glazing shown in these drawings does not correspond to the tested glazing.

2 Procedure

2.1 Sampling

Sampling	The samples were selected by the client
Quantity	1
Manufacturer	Arbor Ahsap Yapi Elemanlari
Site of manufacturing	Arbor Ahsap Yapi Elemanlari, Istanbul, Turkey
Responsible for sampling	Ibrahim Pervan
Delivery at **ift**	Frame member 27. August 2010, Casement member 16. September 2010 by the client via forwarding agency
ift-registration no.	28732/ 00 Frame member 28835/ 01 Casement member

2.2 Process

Basis

EN ISO 140-1:1997 + A1:2004 Acoustics; Measurement of sound insulation in buildings and of building elements - Part 1: Requirements for laboratory test facilities with suppressed flanking transmission

EN ISO 140-3:1995 + A1:2004 Acoustics; Measurement of sound insulation in buildings and of building elements - Part 3: Laboratory measurement of airborne sound insulation of building elements

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 the national German versions:

DIN EN ISO 140-1:2005-03, DIN EN ISO 140-3:2005-03 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.
Deviations	There are no deviations from the test procedure and test conditions.
Test noise	Pink noise
Measuring filter	One-third-octave band filter

Measurement limits

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 140-3:1995 + A1:2004 Clause 6.5.

Maximum sound insulation	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 (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	$R = L_1 - L_2 + 10 \cdot \lg \frac{S}{A}$ dB

Key

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	Test surface of 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	Own design	-
Amplifier	Type E120	FG Elektronik
Rotating microphone boom	Own design / Type 231-N-360	Norsonic-Tippkemper

The **ift** Centre for 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 No. 24842, was calibrated by the Dortmund Eichamt (calibration agency) on 16th September 2008. The calibration is valid until 31st December 2010.

2.4 Testing

Date	22. September 2010
Test engineer	Markus Pütz

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 from 100 Hz to 3150 Hz obtained by calculation are as follows:

R_w (C;C_{tr}) = 42 (-1;-3) dB

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

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

4 Instructions for use

4.1 Calculated value

Basis
DIN 4109:1989-11 Sound insulation in buildings; requirements and testing

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

$R_{w,R}$ = 40 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.

ift Rosenheim
Centre for Acoustics
21. October 2010

Sound reduction index according to ISO 140 - 3

Laboratory measurements of airborne sound insulation of building elements

Client: Arbor Ahsap Yapi Elemanlari, Istanbul, Turkey

Product designation IV 68

ift ROSENHEIM

Design of test specimen

Single-leaf single window

External dimensions	1,230 mm × 1,480 mm
Material	Wood / Meranti
Type of opening	Tilt and turn
Rebate seals	1 central seal, 1 overlap seal
Lockings	at top 0, at bottom 1, on hinge side 1, on lock side 3
Infill panel	Insulating glass unit
Pane configuration	8 LG/16/12 LG
Gas filling in cavity	Argon

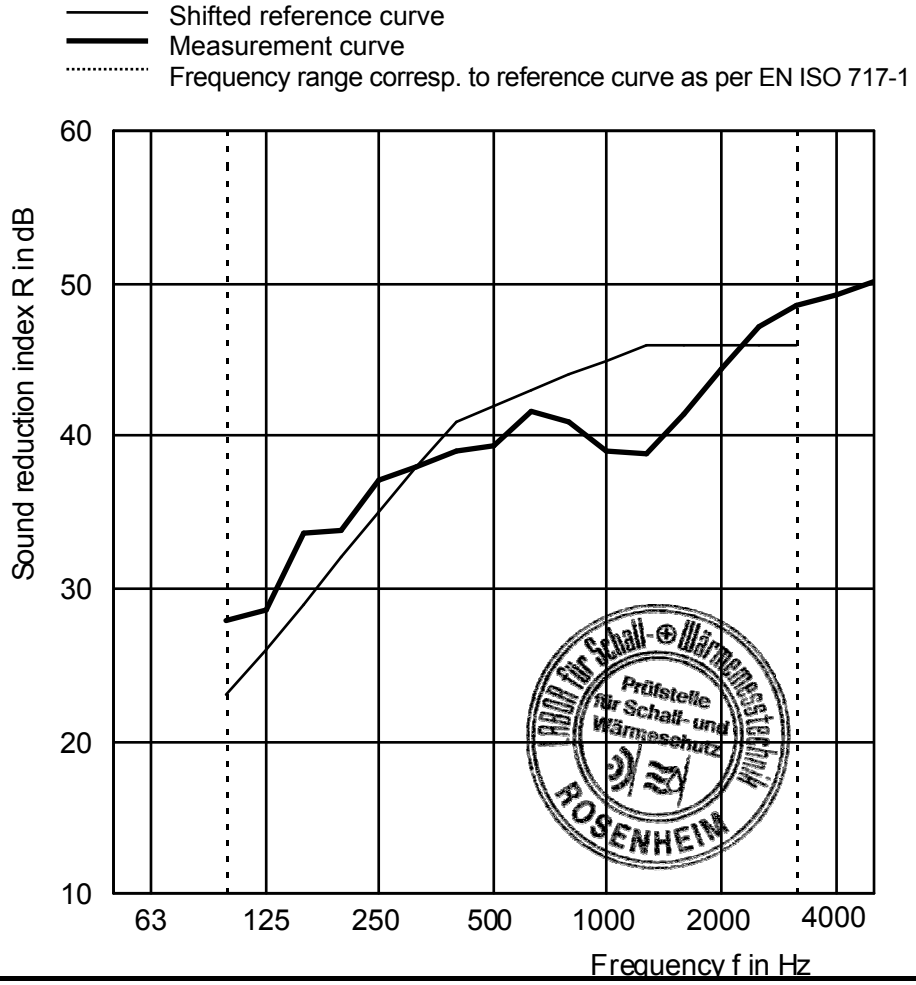
Test date	22. September 2010
Test surface S	1.25 m × 1.50 m = 1.88 m^2
Test rig	as per EN ISO 140-1
Partition wall frame	Double-leaf concrete wall, insert
Test noise	pink noise
Volumes of test rooms	V_S = 104 m^3 V_E = 67.5 m^3

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 22 °C / 58 % RF

f in Hz	R in dB
50	-
63	-
80	-
100	27.9
125	28.6
160	33.6
200	33.9
250	37.1
315	37.9
400	39.0
500	39.4
630	41.6
800	40.9
1000	39.1
1250	38.9
1600	41.4
2000	44.4
2500	47.1
3150	48.6
4000	49.2
5000	50.1



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

R_w (C;C_{tr}) = 42 (-1;-3) dB $C_{50\text{-}3150}$ = - dB; $C_{100\text{-}5000}$ = 0 dB; $C_{50\text{-}5000}$ = - dB

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

Data sheet No. Z4
ift Rosenheim
Centre for Acoustics
21. Oktober 2010

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