

Evidence of Performance

Airborne sound insulation of building elements

Test report 10-000381-PB01-A01-04-en

Translation of Test report no. 10-000381-PB01-A01-04-de
dated 20 September 2010



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

Istanbul
Turkey

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

The test report contains a total of 8 pages:

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

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

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



$$R_w (C; C_{tr}) = 41 (-2; -4) \text{ dB}$$

ift Rosenheim
20. September 2010

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Sachverständige Prüfstelle Gruppe I
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	Side hung casement
Opening direction	To the inside
Mass of the window	83.95 kg
Area related mass	46.1 kg/m ²
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)	80 mm x 70 mm
Casement member	
Casement member size (W x H)	1,152 mm x 1,385 mm
Type	IV 68
Material	Wood / Meranti
Profile section (W x T)	77 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 1,235 mm
Total thickness at edge	37 mm
Total thickness in pane centre	37.5 mm
Configuration	12 LG/16/8 LG
Gas filling in cavity	
Gas	Argon according to Analysis at ift
Volume in %	100%
Configuration of laminated glass	4 mm Float-0,76 acoustic film -4 mm Float 6 mm Float-0,76 acoustic film -6 mm Float
Type of interlayer	Acoustic film
Mounting of infill panels	
Sealing system	with elastic sealant, exterior and interior with glazing tape

Vapour pressure equalization	Two slots each bottom and top, 12 mm x 7 mm
Glashalteleisten	
Position interior / exterior	interior
Type/ manufacturer	Wood profile strips / Arbor Ahsap Yapi Elemanlari

Hardware

Type/ manufacturer	Side hung fitting / Maco
Hinges / pivots	2 hinges
Lockings	at top 1, at bottom 1, on hinge side 0, 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.

2 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

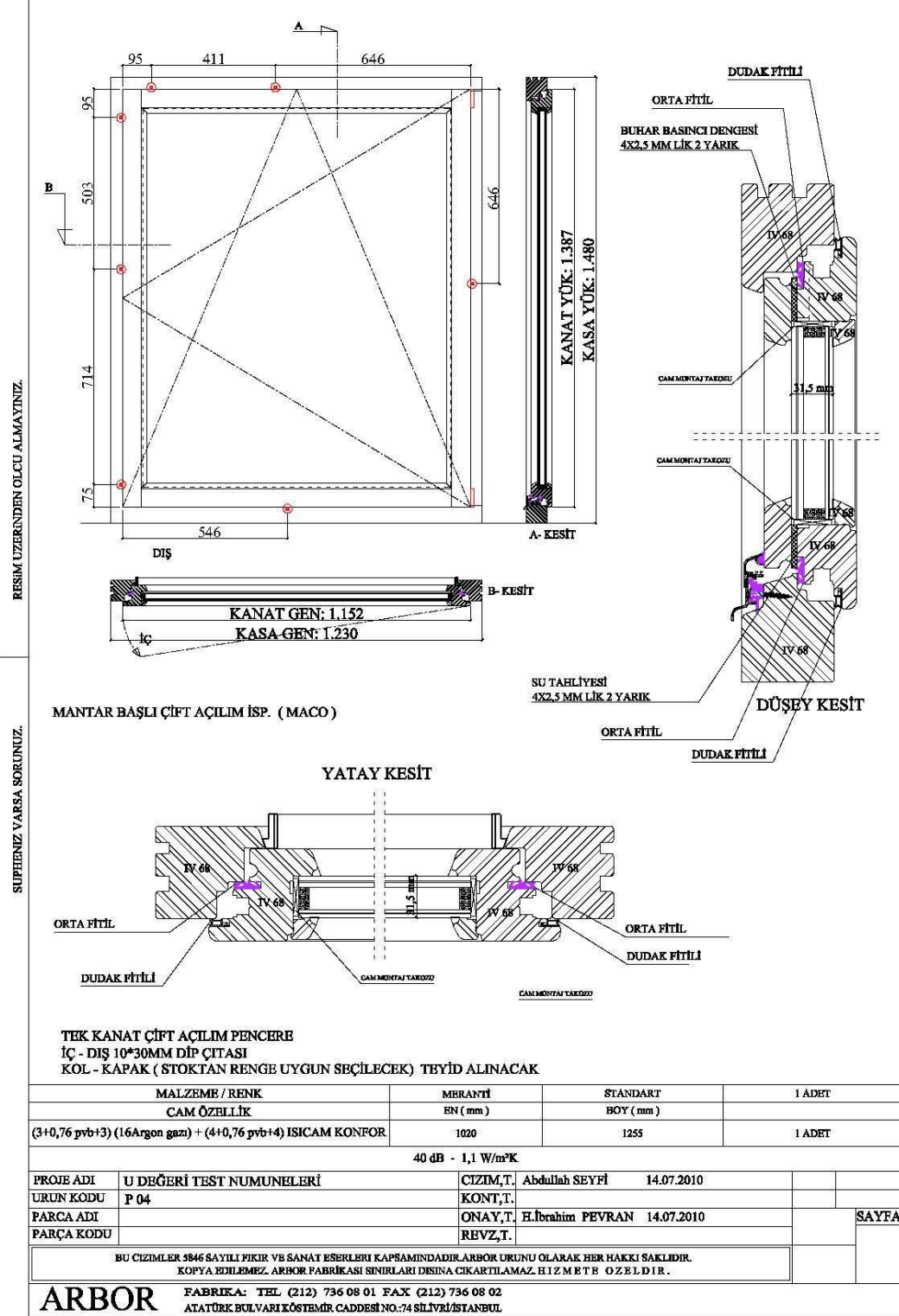


Fig. 2 View, horizontal and vertical section. The glazing shown in these drawings does not correspond to the tested glazing.

3 Procedure

3.1 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	27. August 2010 by the client via forwarding agency
ift-registration no.	28732/01

3.2 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	$A = 0,16 \cdot \frac{V}{T} \text{ m}^2$
Measurement of sound level difference	Minimum of 2 loudspeaker positions and rotating microphones.
Measurement equation	$R = L_1 - L_2 + 10 \cdot \lg \frac{S}{A} \text{ dB}$

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	Test surface of specimen in m ²

3.3 Test equipment

Device	Type	Manufacturer
Integrating sound meter	Type Nortronic 830	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. 17956, was calibrated by the Dortmund Eichamt (calibration agency) on 16th September 2009. The calibration is valid until 31st December 2011.

3.4 Testing

Date	1. September 2010
Test engineer	Markus Pütz

4 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:

$$R_w (C; C_{tr}) = 41 (-2; -4) \text{ dB}$$

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

$C_{50-3150}$	=	- dB	$C_{100-5000}$	=	-1 dB	$C_{50-5000}$	=	- dB
$C_{tr,50-3150}$	=	- dB	$C_{tr,100-5000}$	=	-4 dB	$C_{tr,50-5000}$	=	- dB

5 Instructions for use

5.1 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

$$R_{w,R} = 39 \text{ dB}$$

5.2 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.

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Centre for Acoustics

20. September 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

Design of test specimen

Single-leaf single window

External dimensions 1,230 mm × 1,480 mm

Material Wood / Meranti

Type of opening Side hung casement

Rebate seals 1 central seal, 1 overlap seal

Lockings at top 1, at bottom 1, on hinge side 0, on lock side 3

Infill panel Insulating glass unit

Pane configuration 12 LG/16/8 LG

Gas filling in cavity Argon

Test date 1. September 2010

Test surface S 1.25 m × 1.50 m = 1.88 m²

Test rig as per EN ISO 140-1

Partition wall Double-leaf concrete wall, insert frame

Test noise pink noise

Volumes of test rooms V_S = 104 m³

V_E = 67.5 m³

Maximum sound reduction index

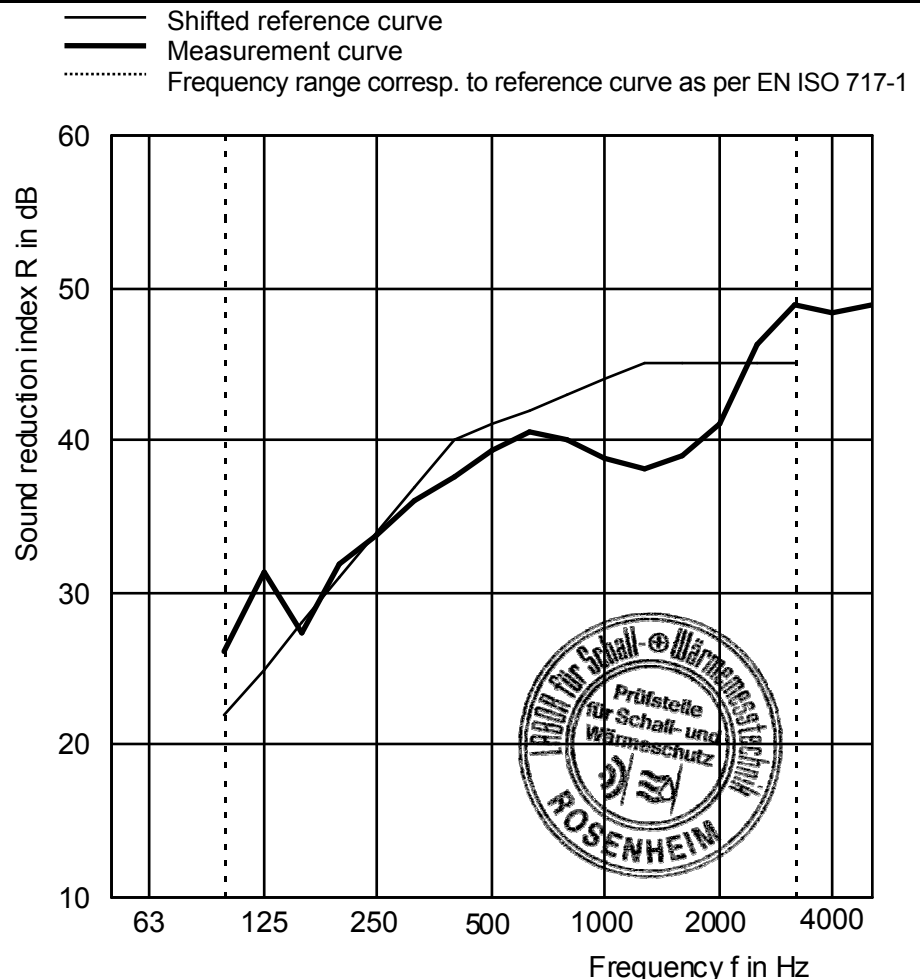
R_{w,max} = 62 dB (related to test surface)

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 / 55 % RF

f in Hz	R in dB
50	-
63	-
80	-
100	26.1
125	31.4
160	27.3
200	31.8
250	33.8
315	36.1
400	37.7
500	39.4
630	40.6
800	40.0
1000	38.9
1250	38.2
1600	39.0
2000	41.1
2500	46.3
3150	48.8
4000	48.4
5000	48.8



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

R_w (C;C_{tr}) = 41 (-2;-4) dB

C₅₀₋₃₁₅₀ = - dB; C₁₀₀₋₅₀₀₀ = -1 dB; C₅₀₋₅₀₀₀ = - dB

C_{tr,50-3150} = - dB; C_{tr,100-5000} = -4 dB; C_{tr,50-5000} = - dB

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Data sheet No. Z12

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Centre for Acoustics

20. September 2010

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