Evidence of performance

Airborne sound insulation of building components

Test report
no. 16-002754-PR02
(PB Z01-A01-04-en-01)

Client	**ORAMA MINIMAL FRAMES LTD** German Road 20300 Loutraki Greece
Product	Sliding door, single leaf with fixed glazed sidelight, Scheme A sliding door, two part
Designation	ORAMA OMEGA
Dimension	2650 mm × 2485 mm
Frame material	aluminium profiles with thermal break
Type of opening	Sliding sash/fixed sash
Rebate seals	4 sealing levels on sides and on top, 2 sealing levels at bottom and in central joint
Glazing	Insulating glass unit, Configuration: 10LSG/32/10LSG, Cavity with Argon, Laminated glass with acoustic film
Special features	-

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

$$R_w\,(C;\,C_{tr}) = 46\ (-1;\,-5)\ \text{dB}$$

ift Rosenheim
01.02.2017

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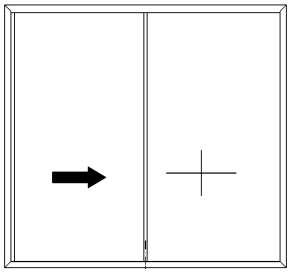
Basis

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

Representation



Instructions for use

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

The weighted sound reduction index R_w can be used for verification by calculation in accordance with DIN 4109-2:2016.

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 construction submitted 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 an abstract.

Contents

The test report contains a total of 11 pages:

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1 Object

1.1 Description of test specimen

Product	Sliding door, single leaf with fixed glazed sidelight, Scheme A sliding door, two part
Product designation	ORAMA OMEGA
Type of opening	Sliding sash/fixed sash
Mass of frame element	365 kg
Area related mass	55 kg/m² (total unit, glazed)
Frame	
Frame member size (w x h)	2650 mm × 2485 mm
Material	aluminium profiles with thermal break
Profile number	250-402 (bottom and sides), 250-404 (top)
Profile section (w × d)	58 mm × 175 (bottom and sides), 72 mm × 175 mm (top)
Weight of frame	46 kg
Sash member	1 sliding sash, 1 fixed sash
Frame member size (w x h)	1301 mm × 2400 mm
Material	aluminium profiles with thermal break
Profile number	250-405 (bottom and sides), 250-404 (top and central joint)
Profile section (w × d)	32 mm × 64 (bottom and sides), 21 mm × 64 mm (top and central joint, central joint plus additional cover profiles)
Rebate configuration	
Rebate drainage	System specific via floor threshold
Rebate seals	4 sealing levels on sides and on top, 2 sealing levels at bottom and in central joint
On top (type, position)	2 seals in frame (both flanking sides), 2 seals in compensation profile
Manufacturer/type	Schlegel, Q-Lon
Threshold (type, position)	2 seals in frame (both flanking sides)
Manufacturer	Schlegel, Q-Lon
Side (type, position)	2 seals (both flanking sides), 2 stop seals in in frame (on both sides of thermal break) cellular rubber (bonded)
Manufacturer	Schlegel, Q-Lon, stop seals: Exalco
Central joint (type, position)	each 1 stop seal in cover profiles of sliding sash and fixed sash
Manufacturer	Exalco
Frame corner seals middle section	each 1 elastomer seal on top and at bottom of frame member middle section
Manufacturer, profile number	Exalco, 1008
fixed sash	outside: 1 seal in frame and elastomeric sealant inside: 1 seal in frame
Manufacturer	Schlegel, Q-Lon

Glazing	Insulating glass unit
Manufacturer, Designation	Ariston Glass
Size of glass (w × h)	1274 mm × 2373
Configuration	10LSG/32/10LSG
Total thickness	52 mm (approx. 0 mm deflection in the middle of pane)
Construction of laminated glass	5 mm Float/0.38 mm acoustic film/5 mm Float
Manufacturer / type of interlayer	SICECAM Porto Nogaro SPA
Gas filling in cavity	Argon, (as specified by manufacturer)
Weight of glass	159 kg/160 kg
Mounting of filling	Surrounding sash profiles on all sides
Sealing system	Wet Glazing with elastomeric sealant
Hardware	
Type	Sliding hardware
Lockings	2 point manual lock to the top and to the bottom

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

1.2 Mounting to test rig

Test rig	Multi-purpose test rig „Z-Wall“ with suppressed flanking transmission acc. to EN ISO 10140-5: 2010; + A1: 2014; the test rig includes a mounting frame with a 5 cm 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 and employees of the client.
Mounting position	Unit mounted on source room side of test rig. External face oriented towards receiving room (for ensuring the test sequence).
Mounting conditions	Element butt-mounted in test opening. The connecting joints were filled with foam and sealed on both sides with plastic sealant
Opening direction	Opened to the side
Preparation	The sash 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 Photos of tested element and view (photos taken by ift Laboratory for Building Acoustics)

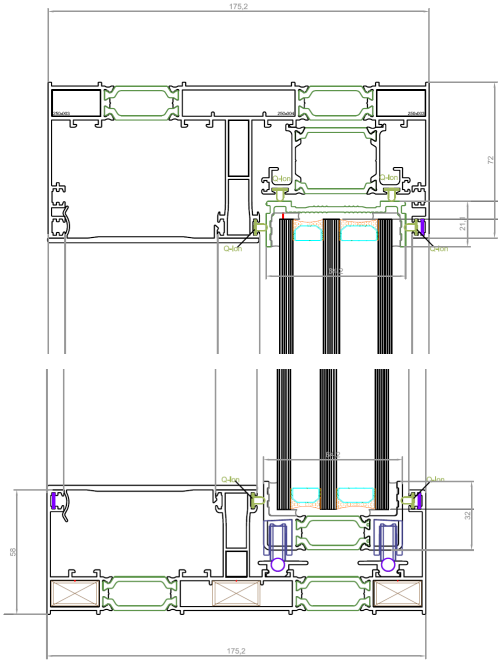


fig 2 Sectional drawing vertical (Basic detail with other glazing)

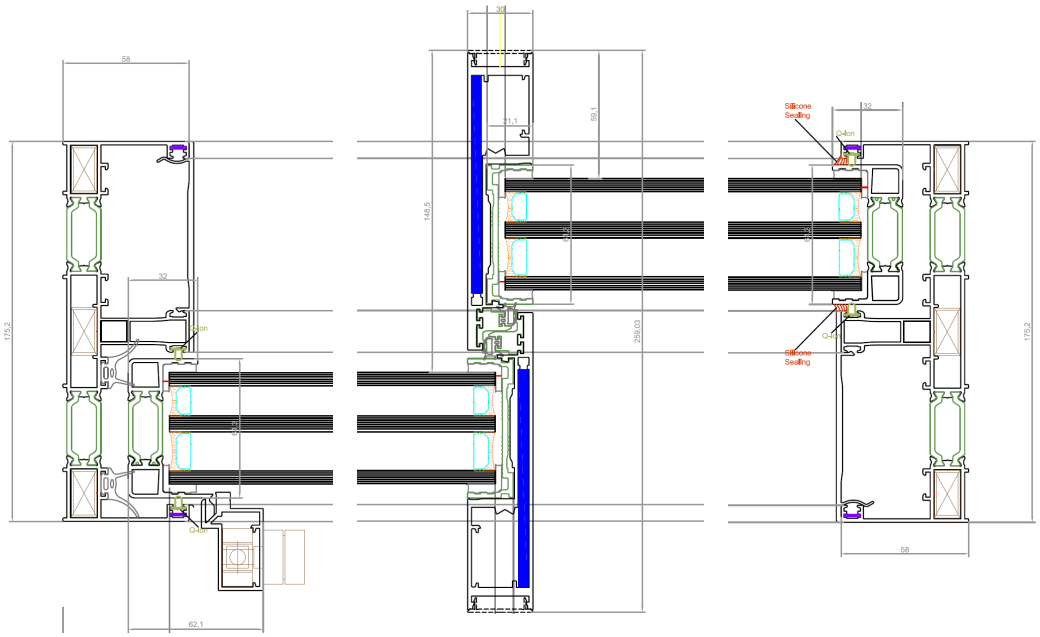


fig 3 Sectional drawing horizontal (Basic detail with other glazing)

2 Procedure

2.1 Sampling

Sampling	The samples were selected by the client
Quantity	1
Manufacturer	ORAMA MINIMAL FRAMES LTD
Manufacturing plant	German Road, 20300 Loutraki
Date of manufacture / Date of sampling	10.12.2016
Production line	not specified
Responsible for sampling	Mr. Giorgios Tsimpikos
Delivery at **ift**	09.01.2017 by the manufacturer
ift registration number	42817/01

2.2 Process

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 standards:

DIN EN ISO 10140-1: 2016-12, DIN EN ISO 10140-2: 2010-12 und
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 control 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 are 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 of 12 independent measurements from 2 loudspeaker positions and ea. 6 microphone positions.

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 $R = L_1 - L_2 + 10 \cdot \lg \frac{S}{A}$ in 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 the specimen in m²

2.3 Test apparatus

Device	Type	Manufacturer
Integrating sound meter	Type Nortronic 830	Norsonic-Tippkemper
Microphone preamplifiers	Type 1201	Norsonic-Tippkemper
Microphone unit	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** 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 2013. The sound level meter used, Series No. 17956, was DKD calibrated by the company Norsonic Tippkemper (DKD - Deutscher Kalibrierdienst “German Calibration Service”) on 26th of January 2015.

2.4 Testing

Date	16th of January 2017
Operating Testing Officer	Mr. Johann Baume

3 Detailed results

The measured data were used to calculate the sound reduction index of the test element. The frequency-dependent values are plotted and tabled in the data sheets enclosed.

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 is obtained by calculation are as follows:

R_w (C; C_{tr}) = 46 (-1; -5) dB

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

$C_{50\text{-}3,150}$	= -2 dB	$C_{100\text{-}5,000}$	= -1 dB	$C_{50\text{-}5,000}$	= -1 dB
$C_{tr,50\text{-}3,150}$	= -7 dB	$C_{tr,100\text{-}5,000}$	= -5 dB	$C_{tr,50\text{-}5,000}$	= -7 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:

$$R_{i,w} = 46.6 \text{ dB}$$

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:

$$R_w = 46.6 \text{ dB} \pm 1.2 \text{ dB}$$

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 σ_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

$$R_w (C;C_{tr}) = 46 (-1; -5) \text{ dB}$$

4.3 Calculated value as per DIN 4109: 1989

Basis

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

Verification of sound insulation in accordance with Building Codes for the transitional period, may require the indication of a calculated value of the weighted sound reduction index in accordance with the previous DIN 4109: 1989-11 (withdrawn as of July 2016). As set out in DIN 4109: 1989-11, the weighted sound reduction index R_w corresponds to the test value $R_{w,P}$. Including a tolerance of 2 dB, this gives the calculated value $R_{w,R}$.

$R_{w,R}$ = 44 dB

4.4 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
Laboratory for Building Acoustics
01.02.2017

Sound reduction index according to ISO 10140 - 2

Laboratory measurements of airborne sound insulation of building components

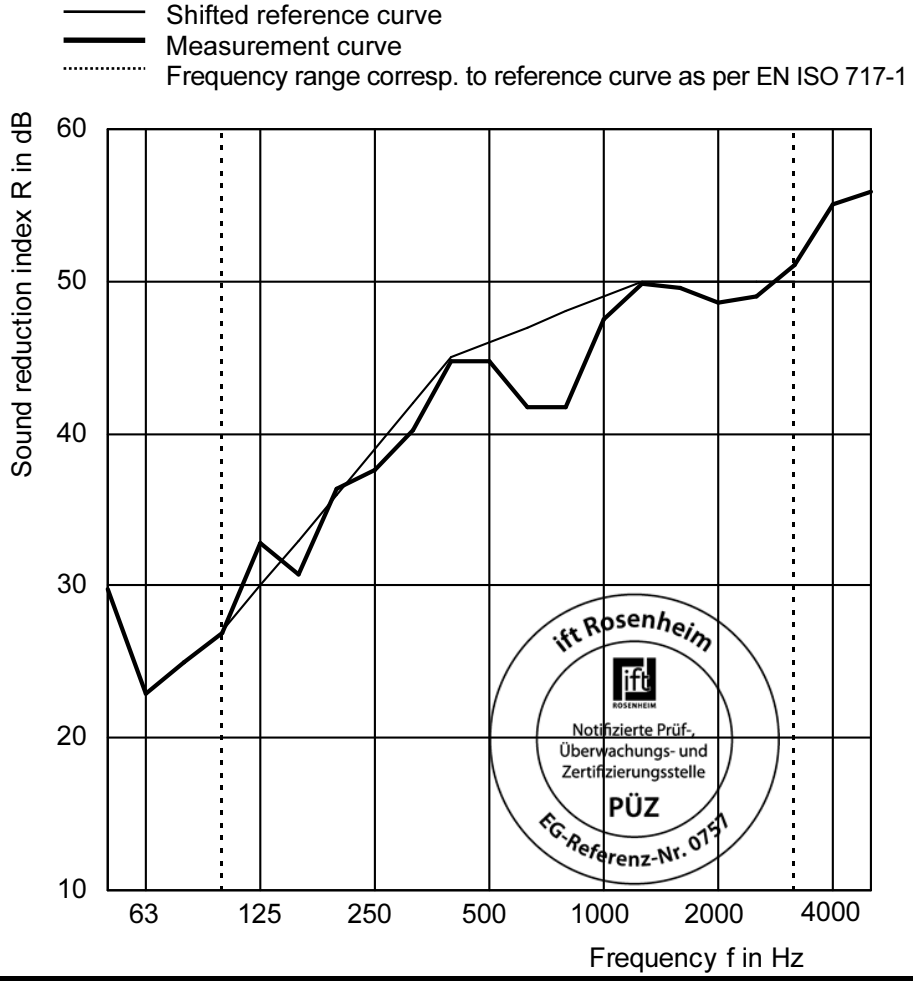
Client: ORAMA MINIMAL FRAMES LTD, 20300 Loutraki (Greece)

Product designation ORAMA OMEGA

Test element	Sliding door, single leaf with fixed glazed sidelight, Scheme A sliding door, two part
Overall dimension	2650 mm × 2485 mm
Material	aluminium profiles with thermal break
Type of opening	Sliding sash/fixed sash
Rebate seals	4 sealing levels on sides and on top, 2 sealing levels at bottom and in central joint
Lockings	2 point manual lock
Glazing	10LSG/32/10LSG, gas filling in cavity: Argon, Laminated glass with acoustic film
Specials	-

Test date 16th of January 2017
Test surface S 2.69 m × 2.52 m = 6.78 m^2
Test rig As per EN ISO 10140-5
Partition wall Double-leaf concrete wall, insert frame
Test noise pink noise
Volumes of test rooms V_S = 104 m^3 V_E = 67.5 m^3
Maximum sound reduction index
$R_{w,max}$ = 67 dB (related to test surface)
Mounting conditions Element butt-mounted in test opening. The connecting joints were filled with foam and sealed on both sides with plastic sealant
Climate in test rooms 20°C / 30% RH
Static air pressure 964 hPa

f in Hz	R in dB
50	29.8
63	22.9
80	25.0
100	26.9
125	32.8
160	30.8
200	36.4
250	37.6
315	40.2
400	44.7
500	44.7
630	41.7
800	41.7
1000	47.5
1250	49.9
1600	49.5
2000	48.6
2500	49.0
3150	51.1
4000	55.0
5000	55.9



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

R_w (C; C_{tr}) = 46 (-1; -5) dB $C_{50\text{-}3,150}$ = -2 dB; $C_{100\text{-}5,000}$ = -1 dB; $C_{50\text{-}5,000}$ = -1 dB

$C_{tr,50\text{-}3,150}$ = -7 dB; $C_{tr,100\text{-}5,000}$ = -5 dB; $C_{tr,50\text{-}5,000}$ = -7 dB

Test report no.: 16-002754-PR02 (PB Z01-A01-04-en-01)
Data sheet 1

ift Rosenheim, Laboratory for Building Acoustics
01.02.2017

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