

Evidence of Performance

Airborne sound insulation of building elements

Test Report
No. 11-000246-PR03
(PB Z06-A01-04-en-01)



Client Fieger Lamellenfenster GmbH
Auf der Aue 10
69488 Birkenau
Germany

Basis

EN ISO 10140-1 : 2010
EN ISO 10140-2 : 2010
EN ISO 717-1 : 1996+A1:2006
Test report 11-000246-PR03
(PB Z06-A01-04-de-01) dated
28 March 2012.

Representation



Product	Three-leaf lamella window
Designation	FLW 40
Overall dimensions (W x H)	1230 mm x 1480 mm
Material	Aluminium-plastic-composite profile
Type of opening	Horizontal opening lamella
Rebate gasket	2 brush seals with lip
Infill	Insulating glass unit, 12 VSG SC/18/ 8 VSG SC
Special features	-/-

Instructions for use

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

Applicable for Germany

- $R_{w,R}$ acc. to DIN 4109:
(R_w corresponds $R_{w,P}$,
 $R_{w,R} = R_{w,P} - 2$ dB)
- $R_{w,R}$ for Building Regulation List

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



$$R_w (C; C_{tr}) = 42 (-1; -4) \text{ dB}$$

ift Rosenheim
13.08.2012

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Validity

The data and results refer solely to the tested and described specimen.

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

Notes on publication

The ift-Guidance Sheet "Advertising with ift test documents" applies. The cover sheet can be used as an abstract

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The report contains a total of 10 pages.
1 Object
2 Procedure
3 Detailed results
4 Instructions for use
Data sheet (1 page)

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Client Fieger Lamellenfenster GmbH, 69488 Birkenau (Germany)



1 Object

1.1 Description of test specimen

Product	Three-leaf lamella window
Product designation	FLW 40
Type of opening/ Opening direction	Horizontal opening lamella
Mass of window	91.5 kg
Area related mass	50.3 kg/m ²
Frame member	
Overall Dimension (W x H)	1230 mm x 1480 mm
Type	FLW 40
Material	Aluminium-plastic-composite profile, thermal break
Frame connection	mitred, glued and pressed with aluminum corner connectors
Profile cross section (W x D)	55 mm x 86 mm
Profile number	Not stated
Casement member	
Frame connection	mitred, screwed with plastic corner connectors
Overall Dimension (W x H)	3 Lamella 1110 mm x 450 mm
Type	
Material	Aluminium-plastic-composite profile, thermal break
Profile number	Not stated
Profile cross section (W x D)	28 mm x 51 mm
Rebate design	
Rebate drainage	At bottom in frame member, 2 slots left and right 6mm x 25mm
Rebate seal	2 brush seals with lip
external (Type / Material / Manufacturer)	Brush seal polypropylene / flail / jointed
internal (Type / Material / Manufacturer)	Brush seal polypropylene / flail / jointed
Pressure equalization / ventilation	Not stated
Infill	Insulating glass unit
Type, Manufacturer	double Neutralux advance 1,1; Arnold Badischer Glashandel
Visible size (W x H)	1052mm x 393mm
Total thickness	39 mm
Construction	12 VSG SC/18/ 8 VSG SC
Gas filling in cavity	According to manufacturer's data
Type of gas	Argon
Filling degree	90 %
Construction of composite panes	6 mm Float-0,76 acoustic films Type SC-6 mm Float 4 mm Float-0,76 acoustic films Type SC-4 mm Float
Type / Manufacturer composite layer	Trosifol Sound Control ("SC"), Kuraray Europe GmbH



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Mounting of filling

Sealing system	With prefabricated sealing profiles
Internal: Type / Material / Manufacturer	EPDM / Duraproof / jointed
External: Type / Material / Manufacturer	EPDM / Duraproof / jointed
Vapour pressure equalization	Not available
Glazing beads	Aluminium
Position internal/ external	Internal

Hardware

Type, Manufacturer	Haroplast
Hinges / Bearing	Pivot with counterpart PA 6.6 Celstran Gf50 (black)
Locking	3 left; 3 right
Closing force	< 10 Nm

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

1.2 Mounting in test rig

Test rig	Window test rig „Z“ without secondary sound channels acc. to EN ISO 10140-5 : 2010; the test rig has an insert frame with a continuous separating joint, which is permanently elastic closed-celled sealed in the test opening.
Mounting of test specimen	Test specimen mounted by ift Laboratory for Building Acoustics.
Mounting conditions	Insertion into the test opening and stuffing the joints with foam material and sealed on both sides with plastic sealant
Mounting position	In a ratio 1/3 to 2/3 in the test opening.
Opening direction	Towards receiving room
Preparation	The window was closed and opened several times.

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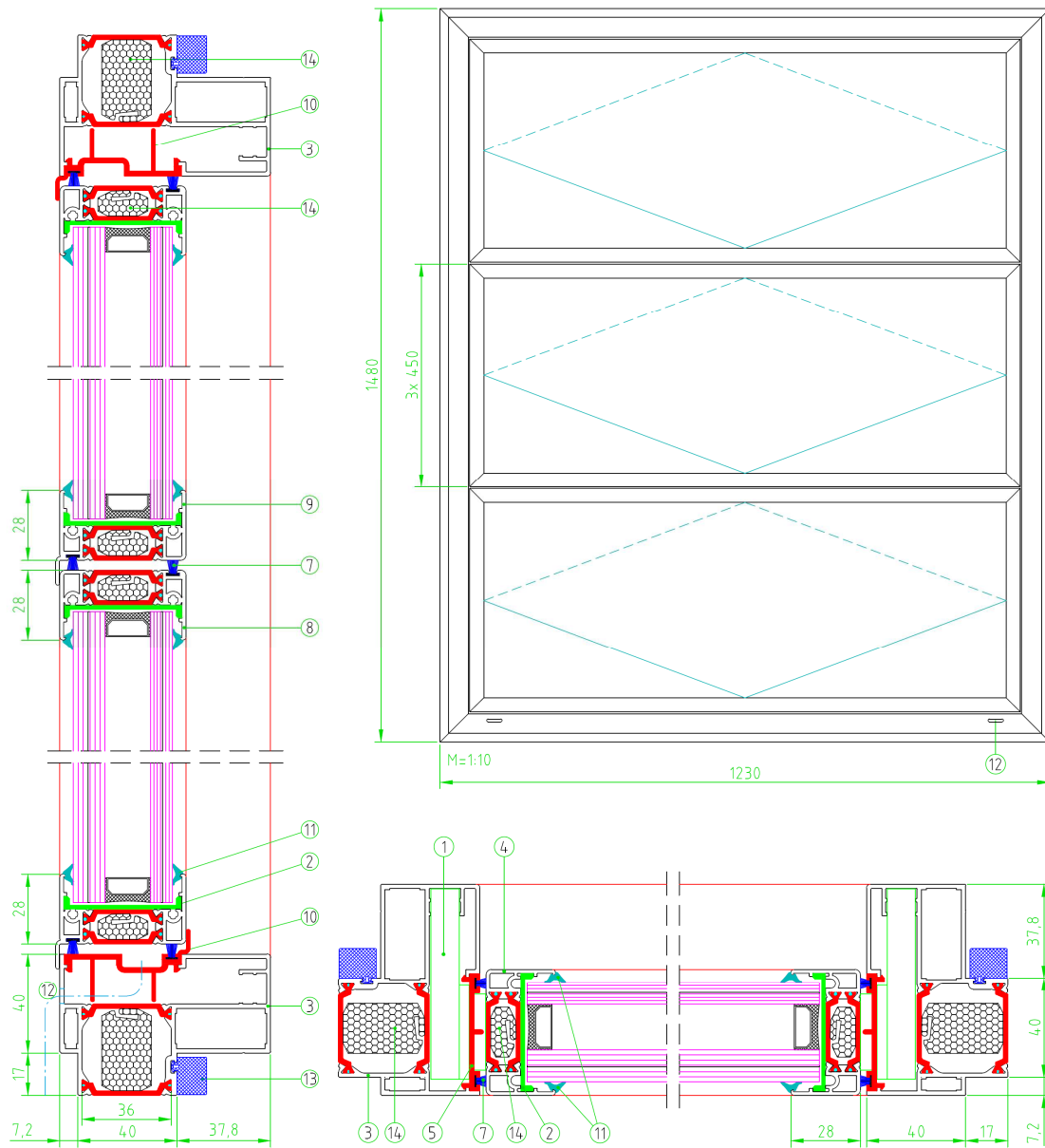
1.3 Representation of test specimen

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



Fig. 1 Photos of the mounted element, created by ift Laboratory for Building Acoustics

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Pos	Bezeichnung	Material	
1	Drehlager	Poliamid 6.6 GF30	3 Lamellen, verglast mit: Neutralux advance 1,1 12mm VSG SC-Folie besch./ SZR 18/8mm VSG SC-Folie
2	Glasauflage	Poliamid 6.6 GF30	
3	Profil R40	AlMgSi0,5	
4	Profil K40	AlMgSi0,5	Antrieb: 1x Handhebel GEZE OL90
5	Beschlag 40	Poliamid 6.6 GF30	
6	Klipp 40	Poliamid 6.6 GF30	
7	Bürstendichtung	Polypropylen	
8	Profil U40	AlMgSi0,5	
9	Profil H40	AlMgSi0,5	
10	Klipp 40	Poliamid 6.6 GF30	
11	Glasdichtung	EPDM	
12	Entwässerung	Schlitz 6 x 25mm	
13	Adaptergummi	EPDM	
14	Dämmung	Polyurethan	

Bear.	Datum	Name	Maßstab
	09.12.2011	T. Fieger	1:2

	Auf der Aue 10 69488 Birkenau Tel. 06201/84434-0 Fax. 06201/84434-19	Fieger Lamellenfenster Typ FLW40
	Für diese Unterlagen wird jeglicher vorgesehene Rechtsschutz nach DIN ISO 15016 in Anspruch genommen.	

Fig. 2 View and section drawings of the lamella window



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Client Fieger Lamellenfenster GmbH, 69488 Birkenau (Germany)

2 Procedure

2.1 Sampling

Sampling	The samples were selected by the client
Quantity	1
Manufacturer	Fieger Lamellenfenster GmbH
Manufacturing plant	9488 Birkenau, Auf der Aue 10
Date of manufacture / date of sampling	24.11.2011
Production line	FLW 40
Responsible for sampling	Mr Pulter Th.
Delivery at ift	11 January 2012 by the client via forwarding agency
ift registration number	31653/1

2.2 Process

Basis

EN ISO 10140-1:2010	Acoustics; Laboratory measurement of sound insulation of building elements - Part 1: Application rules for specific products (ISO 10140-1:2010)
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 the national German standard:

DIN EN ISO 10140-1:2010-12, 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	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



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

LEGENDE

- 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



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2.3 Test equipment

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	DIY	-
Amplifier	Type E120	FG Elektronik
Rotating microphone boom	DIY / 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 No. 31423 was calibrated by the Dortmund Eichamt (calibration agency) on 19 January 2010. The calibration is valid until 31 December 2012.

2.4 Testing

Date 16 January 2012
Testing personnel Markus Schramm

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:

$$R_w (C;C_{tr}) = 42 (-1;-4) \text{ dB}$$

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

$C_{50-3150}$	=	-1 dB	$C_{100-5000}$	=	-1 dB	$C_{50-5000}$	=	-1 dB
$C_{tr,50-3150}$	=	-5 dB	$C_{tr,100-5000}$	=	-4 dB	$C_{tr,50-5000}$	=	-5 dB

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4 Instructions for use

4.1 Calculation value

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 $R_{w,P}$. Taking into account the allowance of 2 dB in the calculated value $R_{w,R}$ results in:

$$R_{w,R} = 40 \text{ dB}$$

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
13.08.2012

Sound reduction index according to ISO 10140 - 2

Laboratory measurements of airborne sound insulation of building elements

Client: Fieger Lamellenfenster GmbH, 69488 Birkenau (Germany)

Product designation FLW 40



Design of test specimen

Three-leaf lamella window

External Dimensions 1230 mm x 1480 mm

Material Aluminium-

Type of opening Horizontal

Rebate seals 2 brush seals with lip

Lockings 3 left; 3

Filling Insulating glass unit

Pane configuration 12 VSG SC/18/ 8 VSG SC

Gas filling in cavity Argon

Test date 16 January 2012

Test surface S 1.25 m x 1.50 m = 1.88 m²

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 m³

V_E = 67.5 m³

Maximum sound reduction index

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

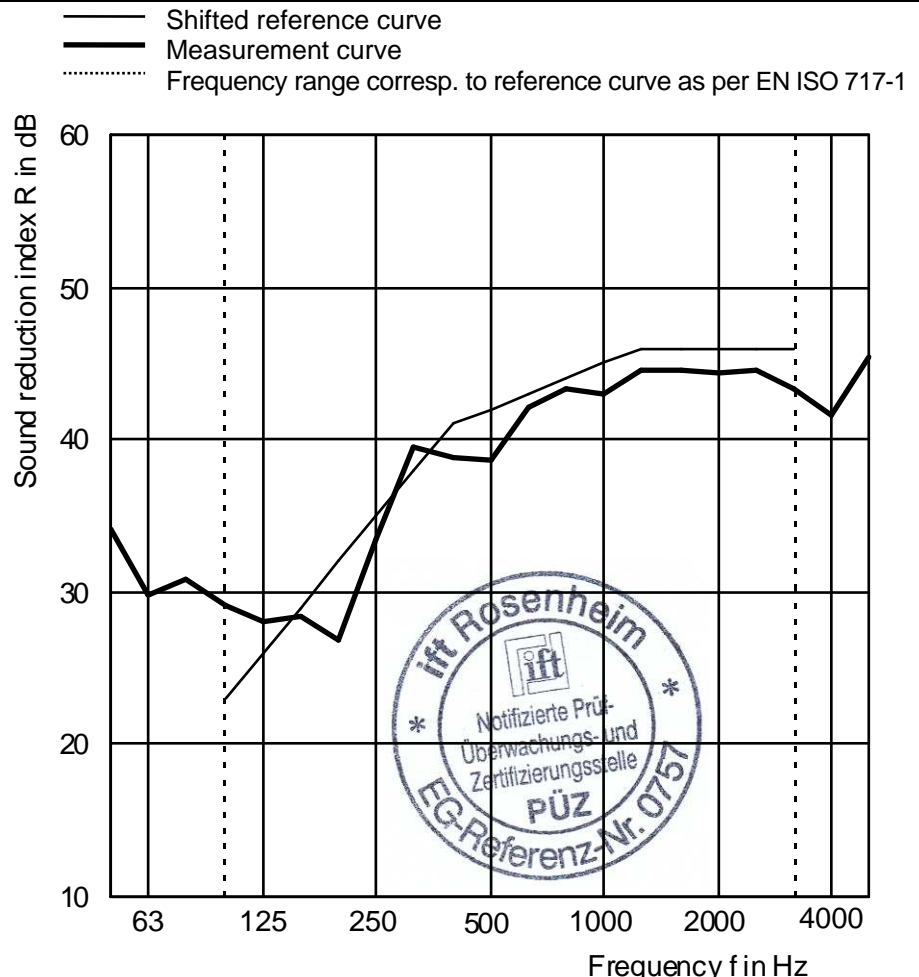
Mounting conditions

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

Climate in test rooms 22 °C / 27 % RF

Static air pressure 967 hPa

f in Hz	R in dB
50	34.1
63	29.8
80	30.9
100	29.1
125	28.0
160	28.5
200	26.9
250	33.4
315	39.5
400	38.8
500	38.6
630	42.1
800	43.4
1000	43.0
1250	44.6
1600	44.5
2000	44.4
2500	44.6
3150	43.3
4000	41.6
5000	45.4



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

R_w (C;C_{tr}) = 42 (-1;-4) dB

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

C_{tr,50-3150} = -5 dB; C_{tr,100-5000} = -4 dB; C_{tr,50-5000} = -5 dB

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Laboratory for Building Acoustics

13.08.2012

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