

# Evidence of Performance

## Airborne sound insulation of building elements

Test Report  
No. 11-002134-PR03  
(PB Z1-A01-04-en-01)



Client **WINDOWS 2000**  
ul. Sobieskiego 23  
84-230 Rumia  
Poland

### Basis

EN ISO 10140-1 : 2010  
EN ISO 10140-2 : 2010  
EN ISO 717-1 : 1996+A1:2006  
11-002134-PR03 (PB Z1-A01-04-de-01) from 24 March 2012.

### Representation



Product	Single window, single-leaf
System Designation	IV 88
External Dimension (W x H)	1230 mm x 1480 mm
Material	Wood - Meranti
Type of opening	Tilt and turn
Rebate seals	1 Internal seal, 1 Central seal, 1 external seal at bottom
Filling	Insulation glass unit , 4 Float/18 cavity/4 Float/ 18 cavity/ 4 Float
Special features	-/-

### 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  $R_{w,P}$ ,  
 $R_{w,R} = R_{w,P} - 2$  dB)
- $R_{w,R}$  for "Bauregelliste"

### Validity

The data and results given relate 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.

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



$$R_w (C; C_{tr}) = 35 (-2; -7) \text{ dB}$$

ift Rosenheim

24 March 2012

Bernd Saß, Dipl.-Ing. (FH)  
Deputy Head of Testing Department  
Building Physics

Michael Ewald  
Operating Testing Officer  
Building Acoustics

### 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 9 pages

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



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## 1 Object

### 1.1 Description of test specimen

<b>Product</b>	Single window, single-leaf
Product designation	IV 88
Type of opening	Tilt and turn
Opening direction	To the inside
Mass of window	67.25 kg
Area related mass	36.94 kg/m <sup>2</sup>
<b>Frame member</b>	
Frame member size (W x H)	1230 mm x 1480 mm
Type / Manufacturer	88 Meranti / Windows 2000
Material	Wood - Meranti
Profile section (W x D)	81 mm x 88 mm
<b>Casement member</b>	
Casement member size (W x H)	1153 mm x 1388 mm
Type / Manufacturer	88 Meranti / Windows 2000
Material	Wood - Meranti
Profile section (W x D)	85 mm x 88 mm
<b>Additional profile / Drainage channel</b>	
Type / Manufacturer	Weather bar with Rebate seal
Material	Aluminium
Profile section (H x T)	50 mm x 25 mm
Installation	4 overlap profiles screw-fitted to frame member, Weather bar with clip connection
<b>Rebate configuration</b>	
Rebate drainage	Over Weather bar / Weather Bar Spree 27 OF
Rebate seal	1 Internal seal, 1 Central seal, 1 external seal at bottom
external (Type / Material / Manufacturer)	Rebate seal on Weather bar
Position	At Frame member at bottom external face
central (Type / Material / Manufacturer)	Inserted gasket, on four sides continuous around perimeter
Position	Cut to mitre and bonded / Deventer SP 6850
internal (Type / Material / Manufacturer)	In casement member
Position	Inserted gasket, on four sides continuous around perimeter
Position	Cut to mitre and bonded / Deventer SP 103
Position	In casement member

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<b>Filling</b>	Insulation glass unit
Type, Manufacturer	Comfort Thermo HP 0,5 / Comfort Glass
Visible size (W x H)	982 mm x 1218 mm
Total Thickness	48 mm
Design	4 Float/18 cavity/4 Float/ 18 cavity/ 4 Float
Gas filling in cavity	
Type of gas	Argon
Volume in %	As specified by client
<b>Mounting of filling</b>	
Sealing system	Filled with pourable sealant, without glazing tape
Internal: Type / Material / Manufacturer	796 / Silicon / Dow Corning
External: Type / Material / Manufacturer	796 / Silicon / Dow Corning
Vapour pressure equalization	hinge- and lock side in glazing rebate per groove at top and at bottom, 4 mm x 7 mm
Glazing beads	Wood - Meranti
Position internal/external	internal
Type / Manufacturer	Windows 2000
<b>Hardware</b>	
Type, Manufacturer	NT / Roto
Hinges/Pivots	1 Hinge, 1 Pivot
Locking	At top 2, at bottom 2, hinge side 2, lock side 1
Closing force	< 10 Nm

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

## 1.2 Mounting in test rig

Test rig	Window test rig „Z“ with suppressed flanking transmission acc. to EN ISO 10140-5: 2010; the test rig includes a mounting frame with a continuous acoustic break which is sealed in the test opening with elastic sealant.
Mounting of test specimen	Test specimen mounted by <b>ift</b> Laboratory for Building Acoustics.
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.

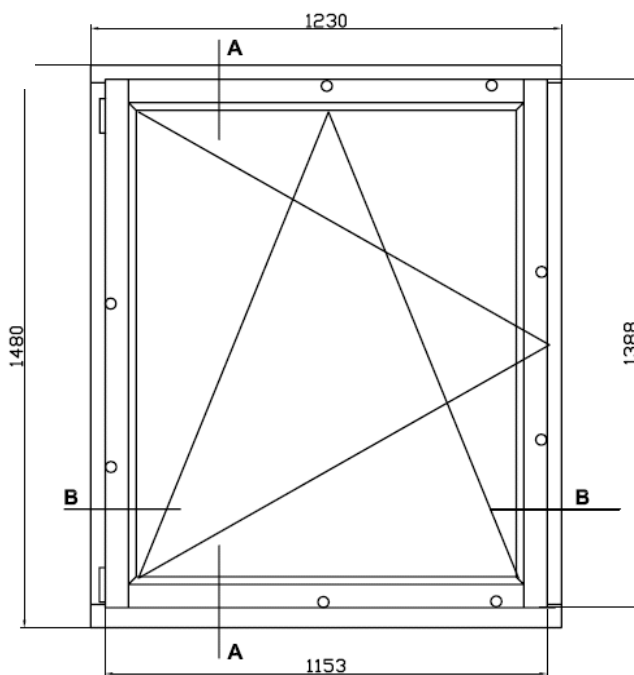
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### 1.3 Representation of test specimen

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** Photo(s) of the mounted element, taken by **ift** Laboratory for Building Acoustics



**Fig 2** View drawing

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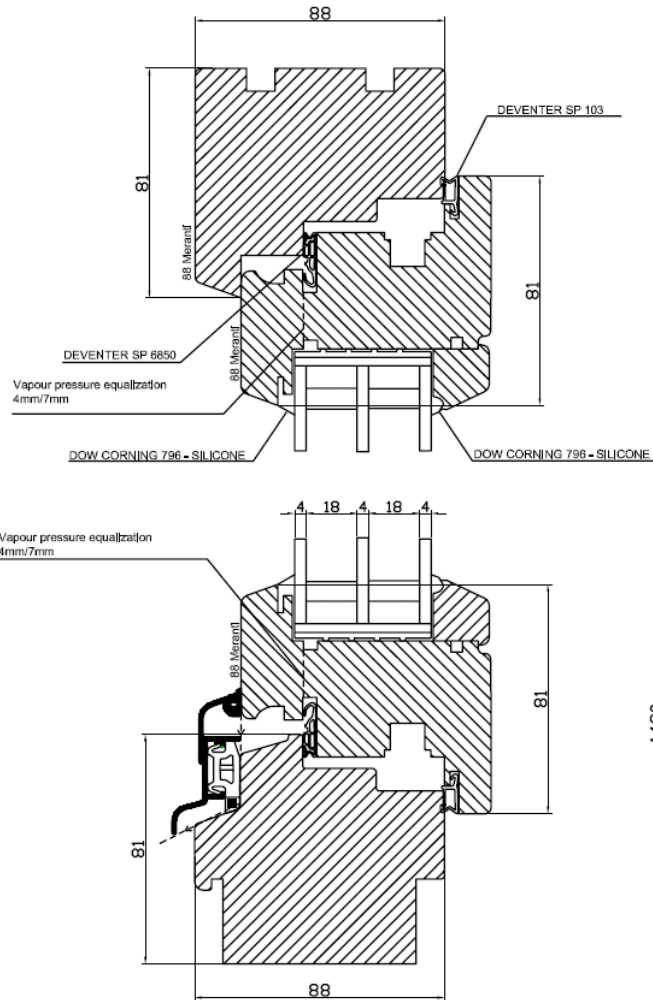


Fig 3 vertical cross-section

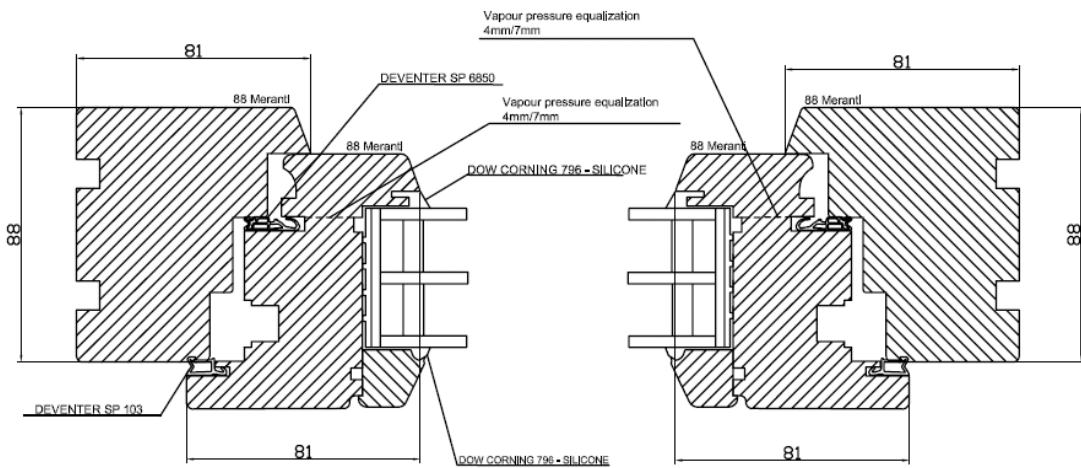


Fig 4 horizontal cross-section



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## 2 Procedure

### 2.1 Sampling

Sampling	The samples were selected by the client
Quantity	1
Manufacturer / Manufacturing plant	Windows 2000 / 78-220 Tychowo Zakład Karny Koszalin Oddział zewnętrzny Dobrowo
Date of manufacture /	08.03.2012 /
Date of sampling	09.03.2012
Production line	1
Responsible for sampling	Damian Kankowski
Delivery at ift	13 march 2012 by the client via forwarding agency
ift registration number	32039-001

### 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 and 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

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### Measurement limits

Low frequencies	The dimensions of the receiving room were 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 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.
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  $R = L_1 - L_2 + 10 \cdot \lg \frac{S}{A} \text{ dB}$

### LEGEND

A	Equivalent absorption area in $\text{m}^2$
$L_1$	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 $\text{m}^3$
S	Testing area of the specimen in $\text{m}^2$

## 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** 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. 24842, was calibrated by the Dortmund Eichamt (calibration agency) on *20 January 2011*. The calibration is valid until *31 December 2013*.



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## 2.4 Testing

Date 16 March 2012  
Operating testing officer Michael Ewald

## 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:

$$R_w (C;C_{tr}) = 35 (-2;-7) \text{ dB}$$

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

$C_{50-3150}$	=	-2 dB	$C_{100-5000}$	=	-1 dB	$C_{50-5000}$	=	-1 dB
$C_{tr,50-3150}$	=	-7 dB	$C_{tr,100-5000}$	=	-7 dB	$C_{tr,50-5000}$	=	-7 dB

## 4 Instructions 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

$$R_{w,R} = 33 \text{ dB}$$

### 4.2 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  
24. März 2012



# Sound reduction index according to ISO 10140 - 2

Laboratory measurements of airborne sound insulation of building elements

Client: WINDOWS 2000, 84-230 Rumia (Poland)

Product designation IV 88



## Design of test specimen

Single window, single-leaf

External dimension 1230 mm x 1480 mm

Material Wood - Meranti

Type of opening Tilt and turn

Rebate seals 1 Internal seal, 1 Central seal, 1 external seal at bottom

Locking At top 2, at bottom 2, hinge side 2, lock side 1

Filling Insulation glass unit

Pane configuration 4 Float/18 cavity/4 Float/ 18 cavity/ 4 Float

Gas filling in cavity Argon

Test date 16 March 2012

Test surface S 1.25 m x 1.50 m = 1.88 m<sup>2</sup>

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<sub>S</sub> = 104 m<sup>3</sup>  
V<sub>R</sub> = 67.5 m<sup>3</sup>

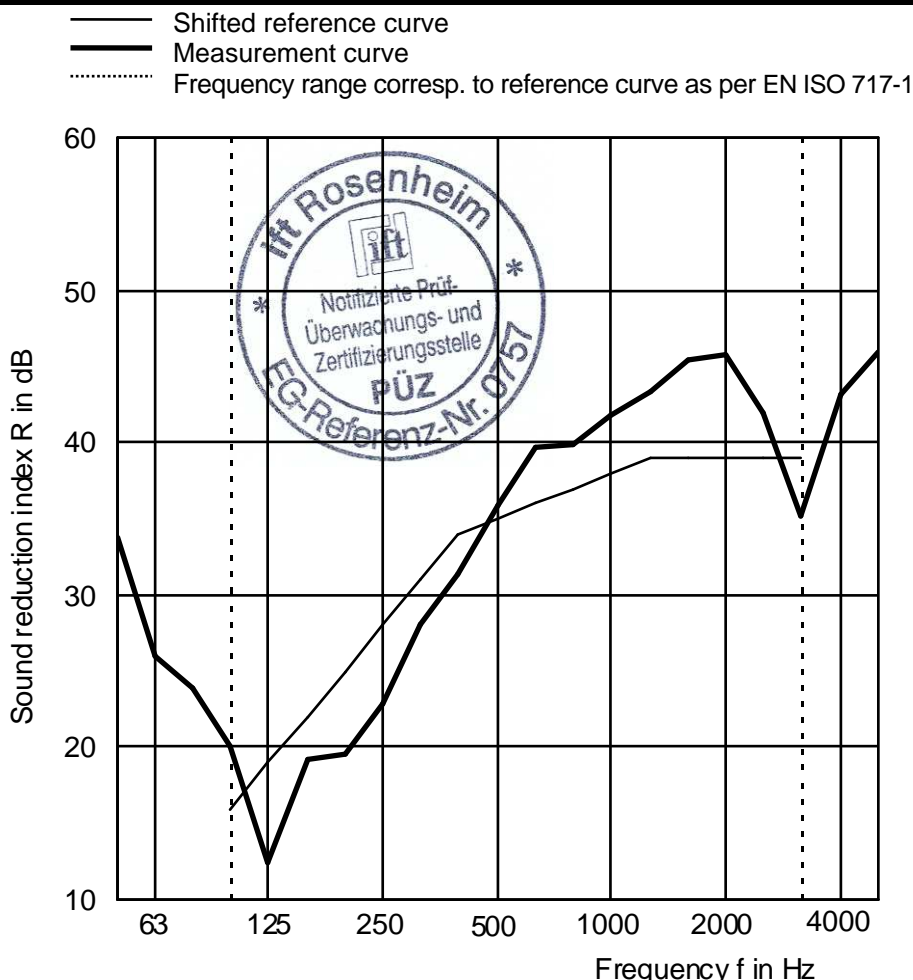
Maximum sound reduction index  
R<sub>w,max</sub> = 62 dB (related to test surface)

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 / 35 % RF  
static air pressure 968 hPa

f in Hz	R in dB
50	33.8
63	26.0
80	23.9
100	20.1
125	12.5
160	19.2
200	19.6
250	22.8
315	28.1
400	31.4
500	35.9
630	39.7
800	39.9
1000	41.7
1250	43.3
1600	45.4
2000	45.8
2500	42.0
3150	35.1
4000	43.2
5000	46.0



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

R<sub>w</sub> (C;C<sub>tr</sub>) = 35 (-2;-7) dB

C<sub>50-3150</sub> = -2 dB; C<sub>100-5000</sub> = -1 dB; C<sub>50-5000</sub> = -1 dB

C<sub>tr,50-3150</sub> = -7 dB; C<sub>tr,100-5000</sub> = -7 dB; C<sub>tr,50-5000</sub> = -7 dB

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Laboratory for Building Acoustics

24. March 2012

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