

# Evidence of Performance

## Airborne sound insulation of building components

### Test Report

No. 16-003401-PR01  
(PB 2-H01-04-en-01)



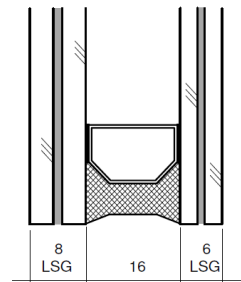
Client **SAINT-GOBAIN POLSKA Sp. z.o.o.**  
**Oddział GLASSOLUTIONS**  
Szklanych Domów 1  
42-530 Dabrowa Górnicza  
Poland

#### Basis

EN ISO 10140-1: 2010  
+A1: 2012 + A2:2014  
EN ISO 10140-2 : 2010  
EN ISO 717-1 : 2013

Product	Insulating glass unit
Designation	SGG Climaplust Safe Silence (no. 31836322)
External Dimensions (W x H)	1,230 mm x 1,480 mm
Construction	8 LSG SI / 16 / 6 LSG
Gas filling	Argon
Area related mass	34.7 kg/m <sup>2</sup>
Special features	-/-

#### Representation



#### Instructions for use

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

Applicable for Germany. Weighted sound reduction index  $R_w$  can be used for evaluation of sound insulation of windows according to DIN 4109-35:2016.

#### 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 further characteristics of the present construction 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)

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



$$R_w (C; C_{tr}) = 41 (-2; -6) \text{ dB}$$

ift Rosenheim  
13.12.2016

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Building Acoustics

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## 1 Object

### 1.1 Description of test specimen (All dimensions in mm)

<b>Component</b>	Insulating glass unit
Product designation	SGG Climaplust Safe Silence (no. 31836322)
External dimensions (W x H)	1,230 mm x 1,480 mm
Visible size (W x H)	1,200 mm x 1,450 mm
Total thickness	31 mm
On the edge	30.4 mm
In the middle of pane	29.9 mm
Area related mass kg/m <sup>2</sup>	34.7 kg/m <sup>2</sup>
Construction	8 LSG SI / 16 / 6 LSG
Construction of laminated glass	4mm float – 0.50mm SILENCE foil – 4mm float 3mm float – 0.38mm PVB foil – 3mm float
Type / Manufacturer of interlayer	For 8 LSG SEKISUI / for 6 LSG TROSIFOL
Pane temperature in °C	20.4°C
Spacers	Spacer bar
Material	Aluminium
Manufacturer	PROFIGLASS
Edge seals	Two planes, total width 9 mm
External type	Polyurethane
Manufacturer	TREMCO
Internal type	PIB
Manufacturer	FENZI
Edge cover	Edge cover 4mm
Gas filling in cavity	According to analysis at <b>ift</b>
Type of gas	Argon
Volume in %	92.4 %

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

### 1.2 Mounting in test rig

Test rig	Window test rig with suppressed flanking transmission acc. to EN ISO 10140-5: 2010+A1:2014; the test rig includes a 5 cm 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	The unit was fitted at a distance of 5 mm into a wooden frame of 25 mm x 25 mm cross section. The cavity between test rig

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and glazing beads was completely filled with plastic sealant type Perennator 2001 S grey.

Mounting position according to EN ISO 10140-1:2010+A1:2012+A2:2014 Annex D

Preparation Storage of the glazing one day before testing in the test rig for conditioning.

## 2 Procedure

### 2.1 Sampling

Sampling	The test specimen were selected by the client
Quantity	1
Manufacturer	SAINT-GOBAIN POLSKA Sp. z.o.o. Oddzial GLASSOLUTIONS
Manufacturing plant , Site of manufacturing	JAROSZOWIEC
Date of manufacture / date of sampling	03/11/2016
Production line	Linia F
Responsible for sampling	Łukasz Biel
Delivery at ift	24 November 2016 by the client via forwarding agency
ift Registration Number	42574/2

### 2.2 Process

#### Basis

EN ISO 10140-1: 2010 + A1: 2012 + A2: 2014 Acoustics; Laboratory measurement of sound insulation of building elements - Part 1: Application rules for specific products (ISO 10140-1: 2010+Amd. 1: 2012+Amd. 2: 2014)

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 standard:

DIN EN ISO 10140-1: 2014-09, DIN EN ISO 10140-2:2010-12 and DIN EN ISO 717-1 : 2013-06

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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 supervisory authorities in cooperation with the standardization committee NA 005-55-75-AA (subcommittee UA 1 - 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
Measurement limits	
Low frequencies	The dimensions of the receiving room full fills the recommended size 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: two measurements each of 2 loudspeaker and 3 microphone positions (a 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	$R = L_1 - L_2 + 10 \cdot \lg \frac{S}{A} \text{ in dB}$

## KEY

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 $\text{m}^2$

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Oddział GLASSOLUTIONS, 42-530 Dabrowa Górnicza (Poland)**2.3 Test equipment**

<b>Device</b>	<b>Type</b>	<b>Manufacturer</b>
Integrating sound meter	Type Nortronic 840	Norsonic-Tippkemper
Microphone preamplifiers	Type 1201	Norsonic-Tippkemper
Microphone unit	Type 1220	Norsonic-Tippkemper
Calibrator	Type 1251	Norsonic-Tippkemper
Dodecahedron loudspeakers	Type 229, 96 Ohm	Norsonic-Tippkemper
Amplifier	Type 235, 100 W	Norsonic-Tippkemper
Rotating microphone boom	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 2016. The sound level meter used, Series No. 17848, was calibrated by the Dortmund Eichamt (calibration agency) on 12th of March 2015. The calibration is valid until 31st of December 2017. LBME NW (Eichamt Dortmund) complies with the requirements of DIN EN ISO / IEC 17025 regarding to the measurement traceability.

**2.4 Testing**

Date 7 December 2016

Operating Testing Officer Markus Schramm

**3 Detailed results**

The values of the measured sound reduction index of the tested Insulating glass unit 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:

$$R_w (C; C_{tr}) = 41 (-2; -6) \text{ dB}$$

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

$$\begin{array}{lll}
 C_{50-3,150} = -2 \text{ dB} & C_{100-5,000} = -1 \text{ dB} & C_{50-5,000} = -1 \text{ dB} \\
 C_{tr,50-3,150} = -7 \text{ dB} & C_{tr,100-5,000} = -6 \text{ dB} & C_{tr,50-5,000} = -7 \text{ dB}
 \end{array}$$

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## 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 4109-35: 2016-07	Sound insulation in buildings – Part 35: Data for verification of sound insulation (component catalogue) – Elements, windows, doors, curtain walling
DIN EN 14351-1:2010-08	Windows and doors - Product standard, Performance characteristics - Part 1: Windows and external pedestrian doorsets without resistance to fire and/or smoke leakage characteristics

Weighted sound reduction index  $R_w$  as given in section 3 can be used for evaluation of sound insulation of windows and doors together with tables in DIN 4109-35 or DIN EN 14351-1.  $R_w$  refers to  $R_{w, \text{GLAS}}$  in table 1 of DIN 4109-35 resp. to  $R_{w, \text{Verglasung}}$  in table 5 of DIN 4109-35.

### 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)
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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:

$$R_w = 41.1 \text{ dB} \pm 1.2 \text{ dB}$$

The specified measurement uncertainty is the average standard deviation of laboratory measurements (standard measurement uncertainty  $\sigma_R$  for measurement situation A: Characterisation of a building component by laboratory measurements as per EN ISO 12999-1: 2014, Table 3  $\sigma_R = 1.2$  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,

$$R_w (C; C_{tr}) = 41 (-2; -6) \text{ dB}$$

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### **4.3 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  
13.12.2016

# Sound reduction index according to ISO 10140 - 2

Laboratory measurements of airborne sound insulation of building elements

Client: **SAINT-GOBAIN POLSKA Sp. z.o.o.**  
**Oddzial GLASSOLUTIONS**, 42-530 Dabrowa Górnicza  
 (Poland)



Product designation SGG Climaplust Safe Silence (no. 31836322)

## Design of test specimen

Insulating glass unit  
 External dimensions 1,230 mm × 1,480 mm  
 Pane configuration 8 LSG SI / 16 / 6 LSG  
 Gas filling in cavity Argon  
 Area related mass 34.7 kg/m<sup>2</sup>  
 Pane temperature 20.4°C

Test date 7 December 2016  
 Test surface S 1.25 m × 1.50 m = 1.88 m<sup>2</sup>  
 Test rig as per EN ISO 10140-5  
 Partition wall Double-leaf concrete wall  
 Test noise pink noise  
 Volumes of test rooms V<sub>S</sub> = 109.9 m<sup>3</sup>  
 V<sub>R</sub> = 101.3 m<sup>3</sup>

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

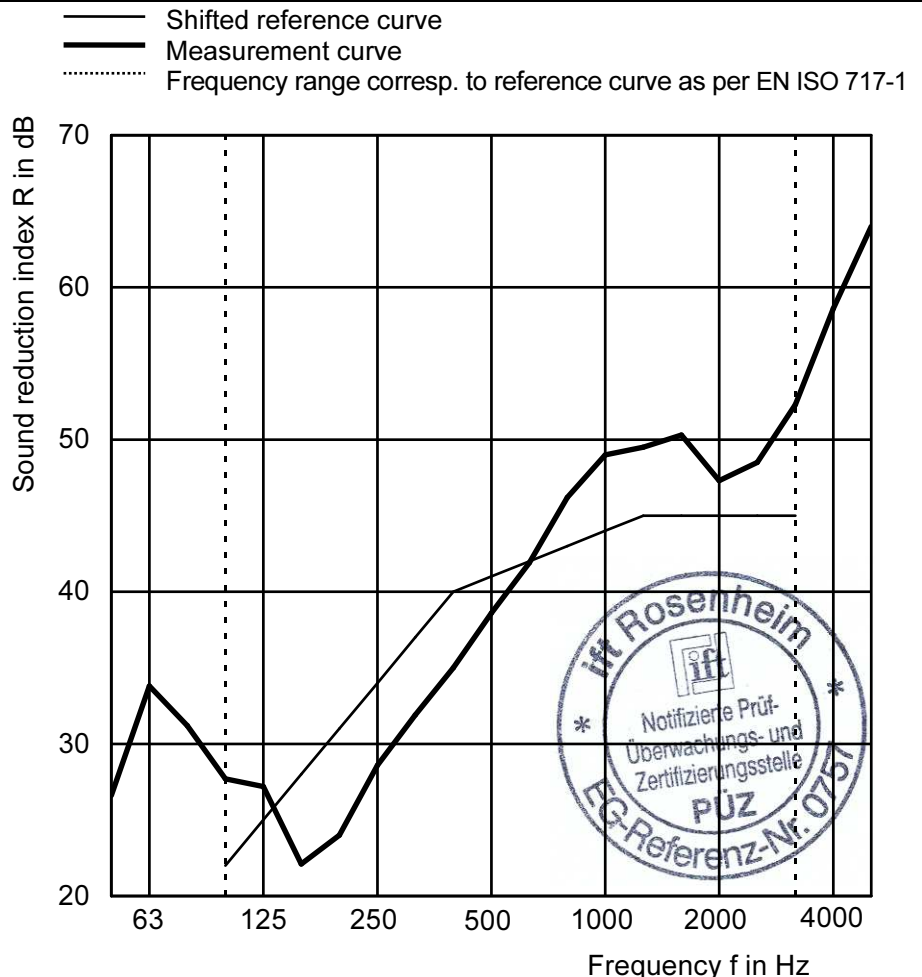
### Mounting conditions

Glass mounted in test opening and held on both sides by glazing beads (25 mm × 25 mm); gap between test rig, glazing and glazing beads was completely filled with plastic sealant

Climate in test rooms 20 °C / 38 % RH

Static air pressure 980 hPa

f in Hz	R in dB
50	26.6
63	33.8
80	31.2
100	27.7
125	27.2
160	22.1
200	24.0
250	28.6
315	31.9
400	35.0
500	38.6
630	41.9
800	46.2
1.000	49.0
1.250	49.5
1.600	50.3
2.000	47.3
2.500	48.5
3.150	52.3
4.000	58.6
5.000	64.0



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

**R<sub>w</sub> (C;C<sub>tr</sub>) = 41 (-2;-6) dB**    C<sub>50-3.150</sub> = -2 dB; C<sub>100-5.000</sub> = -1 dB; C<sub>50-5.000</sub> = -1 dB  
 C<sub>tr.50-3.150</sub> = -7 dB; C<sub>tr.100-5.000</sub> = -6 dB; C<sub>tr.50-5.000</sub> = -7 dB

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Laboratory for Building Acoustics

13. December 2016

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 Operating Testing Officer