



Mfpa Leipzig GmbH

Test, monitoring and certification point for
building materials, products and systems

**Business Unit IV – Construction
Physics**

Prof. Dr.-Ing. habil. Peter Bauer

Work group 4.2 – Noise Protection

Dipl.-Phys. D. Sprinz

Phone +49 (0) 341 - 6582-115

sprinz@mfpa-leipzig.de

D. Erler, B. Sc.

Phone +49 (0) 341 - 6582-162

d.erler@mfpa-leipzig.de

VMPA certified test site to DIN 4109

VMPA-SPG-129-97-SN

Test Site acc. to § 29b BImSchG for Noise

Test report No. PB 4.2/12-184-7

from 03 November 2017

. Duplicate

Object: Measurement of airborne sound insulation to DIN EN ISO 10140-2
VSG glazing with a designation *Muster*
"17-StB-064-14"

Contracting company: Folienwerk Wolfen GmbH
Guardianstraße 4
06766 Bitterfeld-Wolfen

Contract date: 06.09.2017

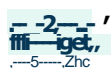
Test data: 17.10.2017

Personnel: D. Erler, B. Sc.
Dipl.-Phys. D. Sprinz

This test report consist of 6 pages and 2 appendices.

This report may only be reproduced in full. A publication – even excerpts – requires prior written permission from Mfpa Leipzig GmbH. The written German form is the legally binding form with original signatures of the drawing approver.

The general business terms and conditions of Mfpa Leipzig GmbH apply.



DAKKS

German
Accreditation site
D,PL-11021-01-00

Certified test lab accredited by DAKKS GmbH to
DIN EN ISO/IEC 17025 akkreditiertes

According to regional building ordinance (SAC 02)
To building product regulation (NB 0800) notified
KM point.

Society of materials research and test institute for the
Building industry Leipzig mbH (Mfpa Leipzig GmbH)

Location: Hans-Weigel-Str. 2b — 04319 Leipzig/Germany
Executive director Prof. Dr.-Ing. Frank Dehn
Comm. register Amtsgericht Leipzig HRB 17719
VAT No.: DE 813200649
Tel.: +49 (0) 341 - 6582-0
Fax: +49 (0) 341 - 6582-135

1. Scope of work

A VSG glazing with the designation "*sample 17-StB-064-14*" from the contracting company

Folienwerk Wolfen GmbH

Guardianstraße 4

06766 Bitterfeld-Wolfen

Should undergo airborne sound insulation measurement to DIN EN ISO 10140-2 in a MFPA Leipzig GmbH test bench and analysed according to DIN EN ISO 717-1.

2. Test objects and test attachments

The glazing to be tested

- With the designation "*sample 17-StB-064-14*"

Outer dimensions (W x H): 1230 mm x 1480 mm

Was delivered on 08.09.2017 by the contracting company of MFPA Leipzig and was integrated into the test opening in the test bench of MFPA Leipzig by specialists of MFPA Leipzig. The test date of the test object is given on the cover page of this report and was done in the test bench after 24 hours of acclimatisation time for the glazing.

Set up of the tested glazing:

Laminated glass 44.2:

- 4 mm Float
- 0.76 mm Evguard® - laminated foil
- 4 mm Float

The aforementioned details about item designations / numbers of test objects and components of the test objects are details from the contracting company.

Integration of the tested windows in the test bench:

The VSG glazing has been integrated in an pre-assembled frame made of wooden slats by specialists from MFPA Leipzig and inserted into the test opening. On both sides of the test component there were different niche depths in a ratio of 2:1. The seal between the test bench and test object and the frame was done with elastic sealant of type Perennator TX 2001 S grey.

Thickness of the glazing determined by measurements of testing

institute: (from outside to inside, each in the centre and edge of the pane) 4 mm float / 0.8 mm foil / 4 mm float
8.8 mm total thickness

Outer dimensions of the glazing:

Height x width = 1480 mm x 1230 mm

(determined by measurement of the testing institute on the day of testing)

Total weight of the glazing:

Total weight: 35.9 kg

(determined by measurement of the testing institute on the day of testing)

The area related weight, regarding the outer dimensions of the glazing, is shown in Appendix 1.

3. Test bench

The test bench complies with the requirements of DIN EN ISO 10140-5.

There is a continuous separating groove between both sand-lime brickwork and concrete echo spaces (sending and receiving spaces) of the test bench to suppress edge transfer

The common separating wall with the integration opening for the test component is made and plastered in a two-shell sand-lime brickwork 2 x 175 mm, raw density class 2.0. In the 50 mm wide continuous separating groove between the brickwork shells there are densely packed mineral wool panels. Other walls of the sending and receiving spaces are built as sand-lime brickwork, raw density class 2.0 and plastered on both sides. The test spaces have a floorplan with one right angle and three irregular angles. The lower ceiling is 140 mm steel reinforced concrete, the upper ceiling is 200 mm steel reinforced concrete.

The test area S of the test opening was 1.88 m² (1.50 m high x 1.25 m wide).

The sender space volumes and the receiving room volumes are detailed in Appendix 1. The air temperatures and the relative humidity in the test spaces as well as the static pressure at the time of measurement are detailed in Appendix 1.

Before starting the test, the pane temperatures of the glazing in the sending and receiving spaces were measured. In both cases the results correspond to the air temperatures in the test spaces according to Appendix 1.

4. Test procedure

Measurement of airborne sound insulation was done according to:

- DIN EN ISO 10140-2, Acoustics, measurement of sound insulation of components in a test bench, Part 2: Measurement of airborne sound insulation, version December 2010

Airborne sound insulation calculations were done according to:

- DIN EN ISO 717-1, Acoustics, Analysis of sound insulation in buildings and of components, Part 1: Airborne sound insulation, version June 2013

Determination of the sound insulation dimension R was done with broadband noise in Terz frequency ranges 50 — 5000 Hz using the available test area. The sound insulation dimension R results from the following equation:

$$R = L_i - L_2 + 10 \lg \left(\frac{S}{A} \right) \text{ in dB}$$

wherein:

- L1 average noise level in the sender area in dB
- L2 average noise level in the receiver area in dB
- S Area of the test body in m²
- A equivalent absorption area in the receiver area in m²

The equivalent absorption area in the receiver area was determined in the receiver space based on 12 echo time measurements terzwise according to the following equation:

$$A = 0,16 \times \frac{V}{T}$$

wherein:

- ✓ Volume of the receiving space in m³
- T Echo time in the receiver area in s

Due to the maximum insulation of the test bench of 76 dB, the measurements were not influenced by edge transfer.

The scope and execution of measurements correspond to the basics of the working group of the building control recognised noise inspection sites in agreement with NABau building subcommittee 00.71.02. A gas analysis of the intermediate space of the pane was not part of the contract.

5. Instrumentation

The instrumentation listed in Table 1 were used:

Tabelle 1: Instrumentation used

Device	Type	Manufacturer
Real-time analyzer with noise generator	840	Norsonic
Free-field microphone	1220	Norsonic
Pre-amplifier	1201	Norsonic
Calibrator	4231	B & K
Power amplifier	235	Norsonic
Loudspeaker combination (Dodekaeder)	229	Norsonic
Microphone swivel system, remote control	231, 252, 253	Norsonic

The instruments were calibrated regularly, the measurement chain was calibrated before and after each measurement. The MFPA Leipzig regularly participates in the comparative measurements for test sites of group I (qualification lab) of the Physikalisch Technischen Bundesanstalt (PTB) Braunschweig (most recently in 2016) and is entered as a test site in the "Directory of test, monitoring and certification sites to the regional construction ordinance" of the German Institute for Construction Technology DIBt under the heading "SAC 02".

MFPA Leipzig is accredited by DAkkS GmbH as a test lab according to DIN EN ISO/IEC 17025.

6. Measurement results

In the following Table 2, the measurement results of the analysed sound insulation dimension R_w is given according to DIN EN ISO 717-1 for a frequency range of 100 to 3150 Hz, each with the spectrum adjustment values.

Table 2: Test results

Test set up	Analysed sound insul. value Test value R_w (C; C.) [dB]	Spectrum adjustment value						See Appendix
		Co5-3150	C50-5000	⁰ 100-5000	Ctr.50-3150	Ctr.50-5000	Ctr.100-5000	
Glazing with the designation "Sample17-StB-064-14"	37 (-2 ; -4)	-2	-2	-2	-5	-5	-4	1

Remarks: the spectrum adjustment values C and Ct, to DIN EN ISO 717-1 should be adjusted to the analysed sound insulation value R_w to the A spectrum and traffic noise at high speed (C value) and city traffic noise (Ctr value). They are only given for information; at this time public law in the Federal Republic of German applies DIN 4109 as the basis for analysis without spectrum adjustment values.

The graphical image of the R-value depending on frequency can be seen in Appendix 1.

Based on DIN EN ISO 717-1, the sound insulation value measured in the test bench and analysed is; R_w (in 1/10 dB with measurement uncertainty):

$$R_w = 37.0 \text{ dB} \pm 1.2 \text{ dB}$$

For the given measurement uncertainty there is an average standard deviation for test bench measurements according to DIN EN ISO 12999-1:2014-09.

7. Information about the test results

For VSG or GH panes there is a dependency of sound insulation from the ambient temperature. For lower temperatures than the test temperature a reduction in noise insulation may occur.

The values determined are test values that were measured under lab conditions.

The results of tests exclusively refer to the described test objects and not to the population. This document doesn't replace any proof of conformity or usability in regards to building ordinances (national / European).

Leipzig, 03. November 2017

Prof. Dr.-Ing. P. Bauer
Business Unit Director

Dipl.-Ing. V. Fenske
Deputy Work Group Manager

Dipl.-Phys. D. Sprinz
Work Group Manager

D: Eler; B. Sc.
Test Engineer

Sound insulation measurement to ISO 10140-2

Measurement of airborne sound insulation of components in a test bench

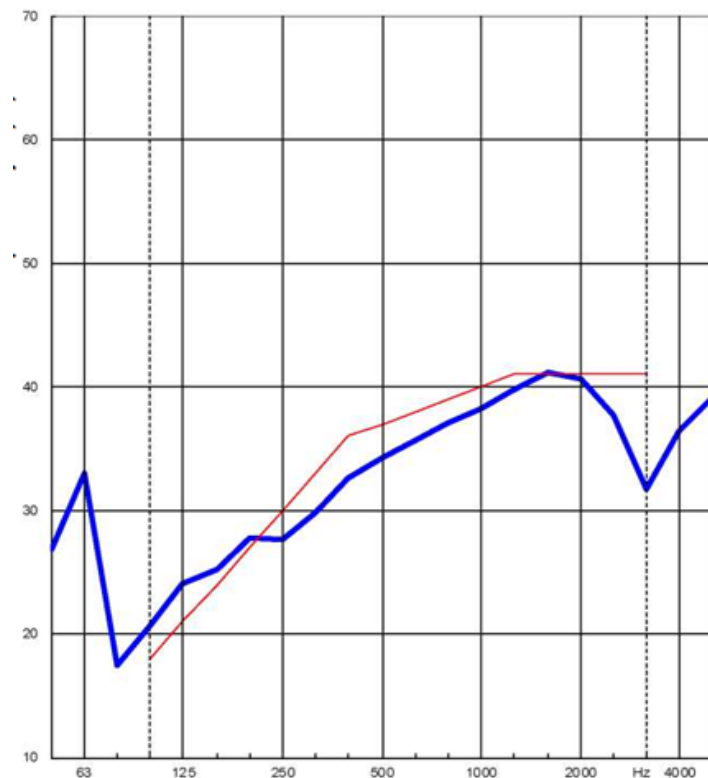
Testing date:
 17.10.2017

Contracting company: Folienwerk Wolfen GmbH, Guardianstraße 4, D-06766 Bitterfeld-Wolfen
 Manufacturer: Auftraggeber
 Test object integrated into: Test space designation: MFPA Leipzig GmbH B F.02 / B F.01
 Product designation: VSG glazing with designation "Sample 17-StB-064-14"
 Test object set up: Outer dimensions (W x H): 1230 mm x 1480 mm
 Pane set up: Laminated glass 44.2
 - 4 mm Float
 - 0.76 mm Evguard® - Laminated
 - 4 mm foil float

Area S test object: 1.88m'
 Area related weight: 19.7 kg/m'
 Temperature SR / ER: 21 / 21 °C
 Rel. humidity SR / ER: 48 / 47 %
 Static pressure: 100 kPa
 Volume SR / ER: 78.5 / 57, m'
 (SR = Sender space; ER = receiver space)

The frequency range corresponding to the curve of the displaced reference value (ISO 717-1)

Frequenz f [Hz]	R Terz [dB]
50	26.9
63	33.0
80	17.4
100	20.6
125	24.1
150	25.2
200	27.8
250	27.7
315	29.8
400	32.6
500	34.3
630	35.7
800	37.1
1000	38.2
V50	39.7
1500	41.1
2000	40.7
2500	37.7
3150	31.7
4000	36.4
5000	39.2



Analysis to ISO 717-1

$$R_w(C;Ctr) = 37 (-2 ; -4) \text{ dB}$$

The determination was based on test bench M that was obtained in Terz bands.

C₅₀₋₃₁₅₀ = -2 dB C₅₀₋₅₀₀₀ = -2 dB C_{100-5000,r} = -2 dB dB
 C_{r50-3150} = -5 dB C_{r50-5000} = -5 dB C_{1r,100-5000} = -4 dB



**Figure A.2.1: tested glazing
(sender space side)**



**Figure A.2.2: tested glazing
(receiver test side)**