

SG-Bauakustik

Institut für schalltechnische Produktoptimierung

Test Report

No. 1238-001-09 of 27.10.2009

**Airborne Sound Insulation of an All-glass
rotary slide system in Laboratory**

Customer: Sunflex Aluminiumsysteme GmbH
Im Ruttenberge 12
57482 Wenden

Test Item: All-glass rotary slide system
Sunflex, Type SF 25

Task: Determination of the Airborne Sound Insulation
acc. to DIN EN ISO 140-3 in the Laboratory

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1. Test and General Information

1.1 Test

Sunflex Aluminiumsysteme GmbH, Wenden, manufactures and sells rotary slide systems, which can be used as balcony glazing or dwelling space expansions. The system to be tested, type SF 25, involves single all-glass panels running on rails, which can be opened across the entire front and laterally parked as a package.

The System SF 25 has to be installed in the test stand and tested in respect for airborne sound insulation. For this purpose, the design consisting of 5 individual wings has to be installed in the test opening with the dimensions width x height = 4.100 mm x 1.600 mm with suppressed flanking transmission acc. to DIN EN ISO 140-1.

The measured sound reduction index of the test item, manufactured by the Customer, is determined by functional conditions acc. to DIN EN ISO 140-3.

1.2 Measuring Standard

The measurements were established according to the following standards and directives:

- DIN EN ISO 140-3 „Acoustics – Measurement of the Sound Insulation in Buildings and Components – Part 3: Measurement of the Airborne Sound Insulation of Components in Laboratory“ (ISO 140-3:1995 + AM 1:2004); German version EN 20 140-3:1995 + A1:2004
- DIN EN ISO 140-1 „Acoustics – Measurement of the Sound Insulation in Buildings and Components – Part 1: Requirements for Laboratory with suppressed Flanking Transmission“ (ISO 140-1:1997 + AM 1:2004); German version EN ISO 140-1:1997 + A1:2004
- DIN EN ISO 717-1 „Acoustics – Evaluation of the Sound Insulation in Buildings and Components – Part 1: Airborne Sound Insulation (ISO 717-1:1996)“; German version EN ISO 717-1:1996

1.3 Manufacturer of the Test Arrangement

Sunflex Aluminiumsysteme GmbH
 Im Ruttenberge 12
 57482 Wenden

1.4 Customer of the Test

Sunflex Aluminiumsysteme GmbH
 Im Ruttenberge 12
 57482 Wenden

2. Test Item Setup and Test Arrangement

2.1 Laboratory

The specified elements was installed by the fitters of the manufacturer for the determination of the airborne sound insulation in the test stand belonging to the institute with suppressed flanking transmission according to

DIN EN ISO 140-1.

The maximum sound reduction index R_{max} of the test stand with installation of a lightweight wall acc. to DIN EN ISO 140-1, Appendix A.2.1 is:

f_{Terz} in Hz	50	63	80	100	125	160	200	250	315	400	500
R_{max} in dB	29,2	40,8	34,6	44,1	44,3	49,6	55,7	59,6	61,6	63,8	68,1

f_{Terz} in Hz	630	800	1000	1250	1600	2000	2500	3150	4000	5000
R_{max} in dB	70,6	72,0	75,1	74,6	73,2	73,3	78,7	83,0	86,2	90,5

The weighted sound reduction index is:

$$R_{w, max} = 68 \text{ dB.}$$

The surrounding wall of the rotary slide system was installed by skilled personnel of the testing institute. In order to achieve an adequate high sound insulation, the wall panels, approx. $d = 500$ mm overall wall thickness, were installed with separate metal stands on both sides of the joint.

2.2 Test Setup

The element tested involves a rotary slide system, which consists of 5 individual all-glass movable panels. The turn and slide panels (non-connected) run on a floor rail with height adjustable ceiling rail. The lateral wall profile connection is sealed. The dimensions of the complete element is approx. width x height = 4.100 mm x 1.600 mm. The surface area is approx. 6,6 m².

The glazing units indicate the following design features:

Assembly: ESG, $d = 8$ mm

The following constructional systems were tested:

Measurement 1: Rotary slide system SF 25

Measurement 2: Rotary slide system SF 25 with vertical gap seals

The detailed setup of the design is evident from the drawings of the manufacturer, Annexes 1 thru 4.

The joints between the ceiling rail and the floor rail and the test opening were sealed with silicon mass.

Annexes 5 and 6 include a photo documentation of the setup in the Laboratory. Annex 7 shows a principle diagram of the test arrangement.

3. Measurement and Measurement Implementation

The measurement of the weighted sound reduction index of the window design R_w in dB was carried out in accordance with the specifications of the standard

- DIN EN ISO 140-3
„Measurement of the Airborne Sound Insulation in Buildings and Components“
Part 3: „Measurement of the Airborne Sound Insulation of Components in Laboratory“

The setup of the measurement, as well as a measurement description, is evident from Annex 8 of this Test Report.

4. Measurement Results

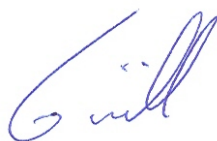
The weighted sound reduction indexes of the assemblies tested on 15.10.2009 being installed in functional condition were determined without influence of the flanking components as follows:

Measurement	Test Item	Weighted Sound Reduction Index R_w in dB
1	Rotary slide system SF 25, setup see section 2.2 and Annexes 1 thru 4	22
2	Rotary slide system SF 25 with gap seal, setup see section 2.2 und Anlagen 1 thru 4	29

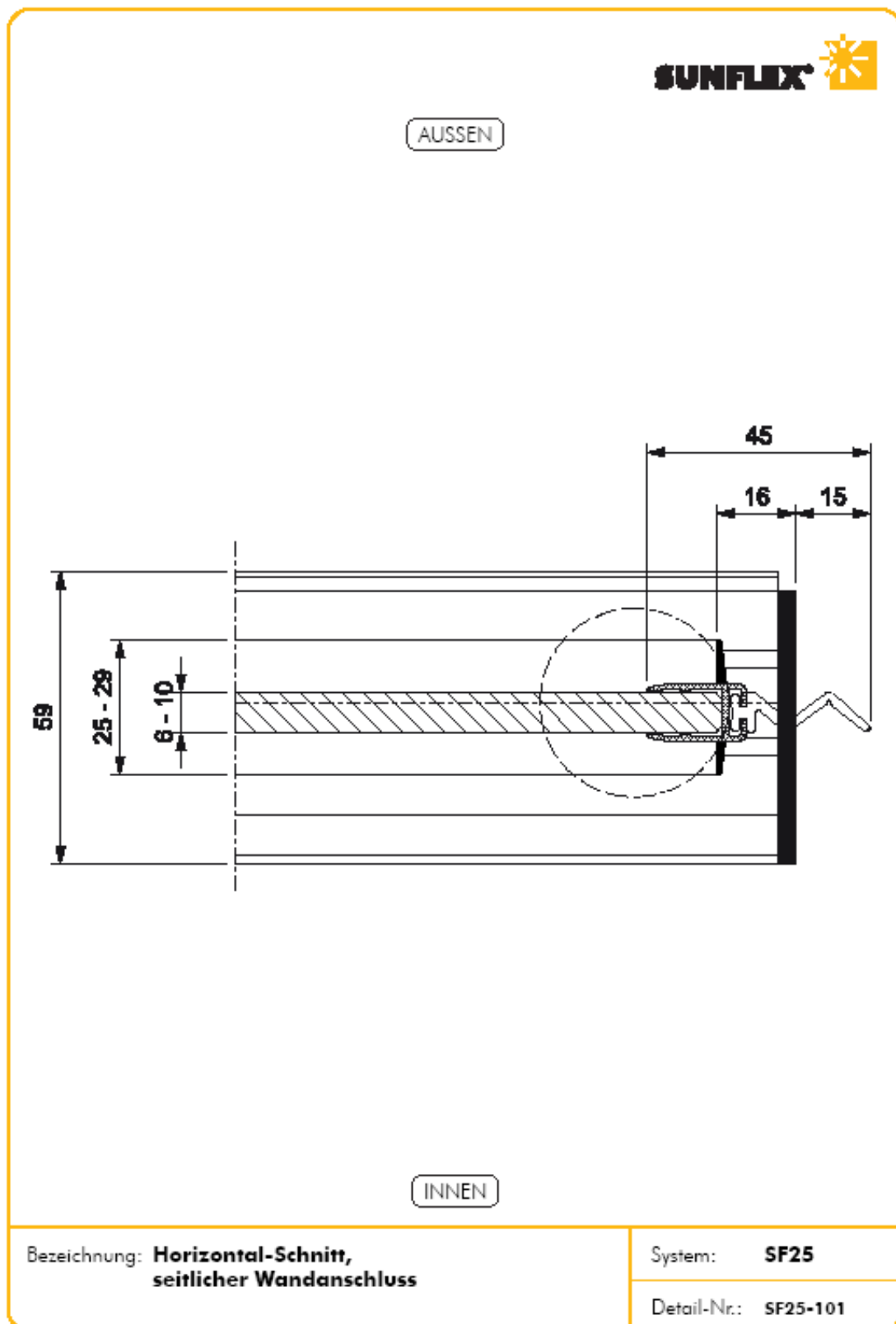
The frequency dependent curve progressions of the sound reduction index are evident from Annexes 9 and 10.

The measurement results show test stand values. In case of plane application a derivative margin of 2dB must be taken into account.

Mülheim an der Ruhr, 27.10.2009

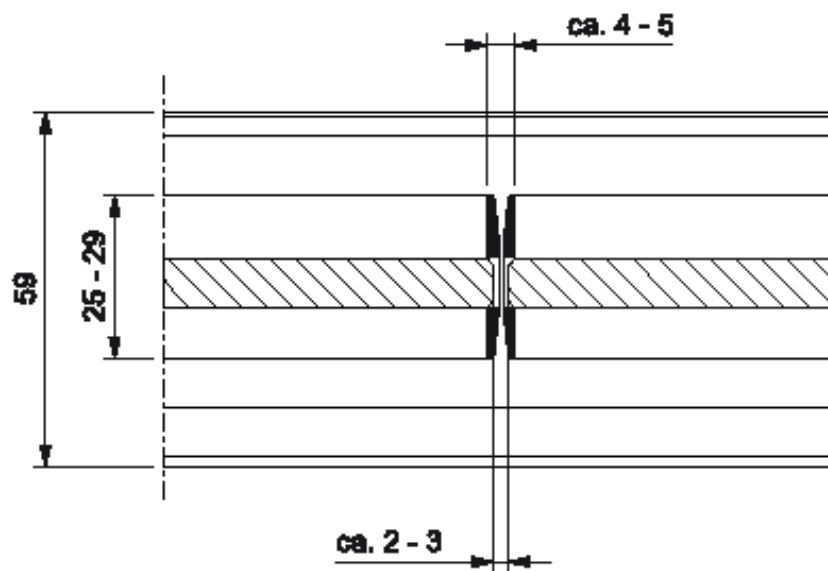


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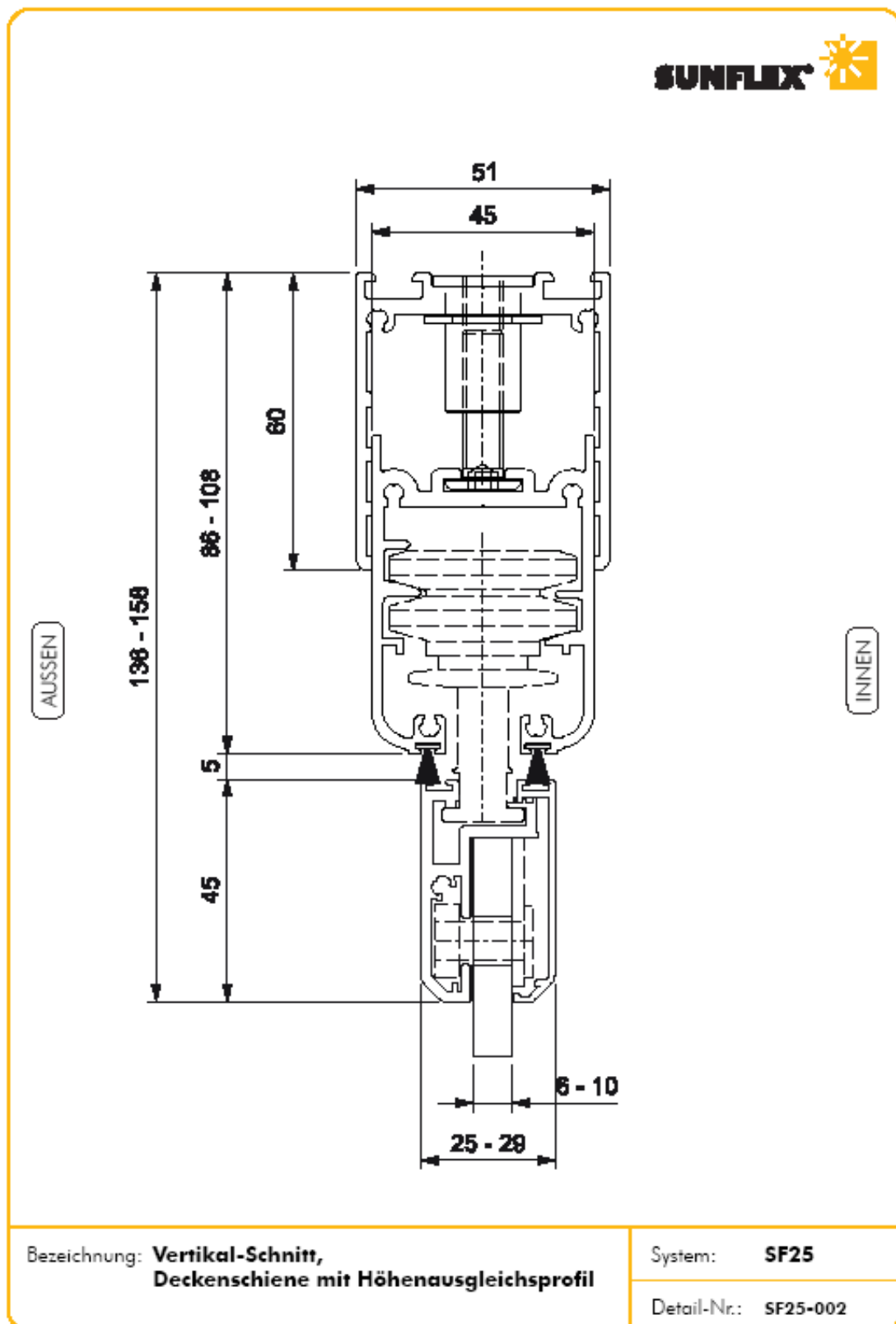
SUNFLEX 

AUSSEN



INNEN

Bezeichnung: **Horizontal-Schnitt,
Flügel - Flügel**System: **SF25**Detail-Nr.: **SF25-102**



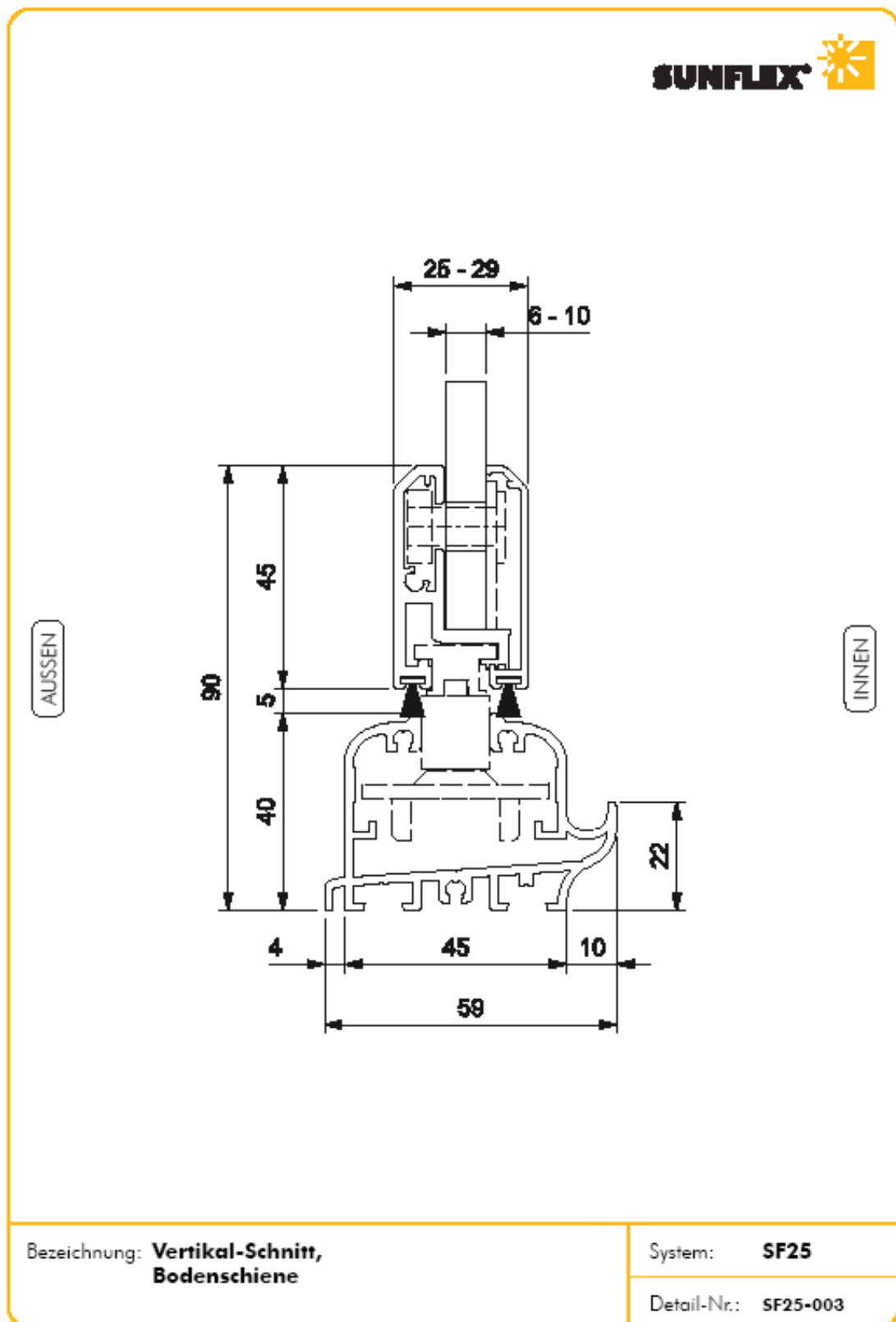


Fig. 1: View Transmission Room, Measurement 1



Fig. 2: View Receiving Room, Measurement 2



Fig. 3: View Transmission Room, Measurement 1, Detail

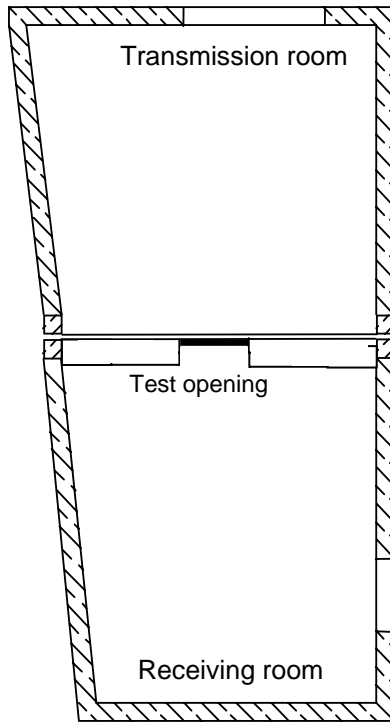


Fig. 4: View Receiving Room, Measurement 2, Detail

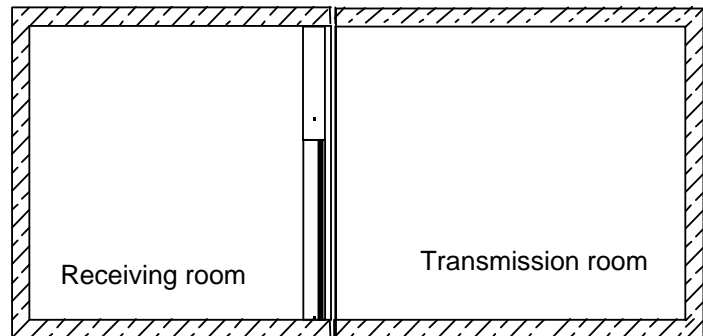


Principle Diagram

Ground View



Vertical Section



- Mountings:**
- Ceiling - Reinforced concrete ceiling $d = 14 \text{ cm}$, spaces with latex paint, Site-specific mass $\gamma_F = 322 \text{ kg/m}^2$
 - Floor - Reinforced concrete plate $d = 20 \text{ cm}$, straightened, Site-specific mass $\gamma_F = 460 \text{ kg/m}^2$
 - Walls - Masonry $d = 24 \text{ cm}$, site-specific mass $\gamma_F = 384 \text{ kg/m}^2$

- Ambient air:** Ambient air conditions during the measurement on 15.10.2009
- Air temperature $v_L = 18.3^\circ\text{C}$
 - Relative humidity $r_F = 61.4\%$

Room Conditions		Receiving Room	Transmission Room
Breadth b	[m]	4.10 – 4.70	4.70 – 5.32
Length	[m]	4.48	4.38
Height	[m]	3.76	3.76
Volume V	[m ³]	72.5	81.5
Rev. time	T_n [s]	1.32	1.28

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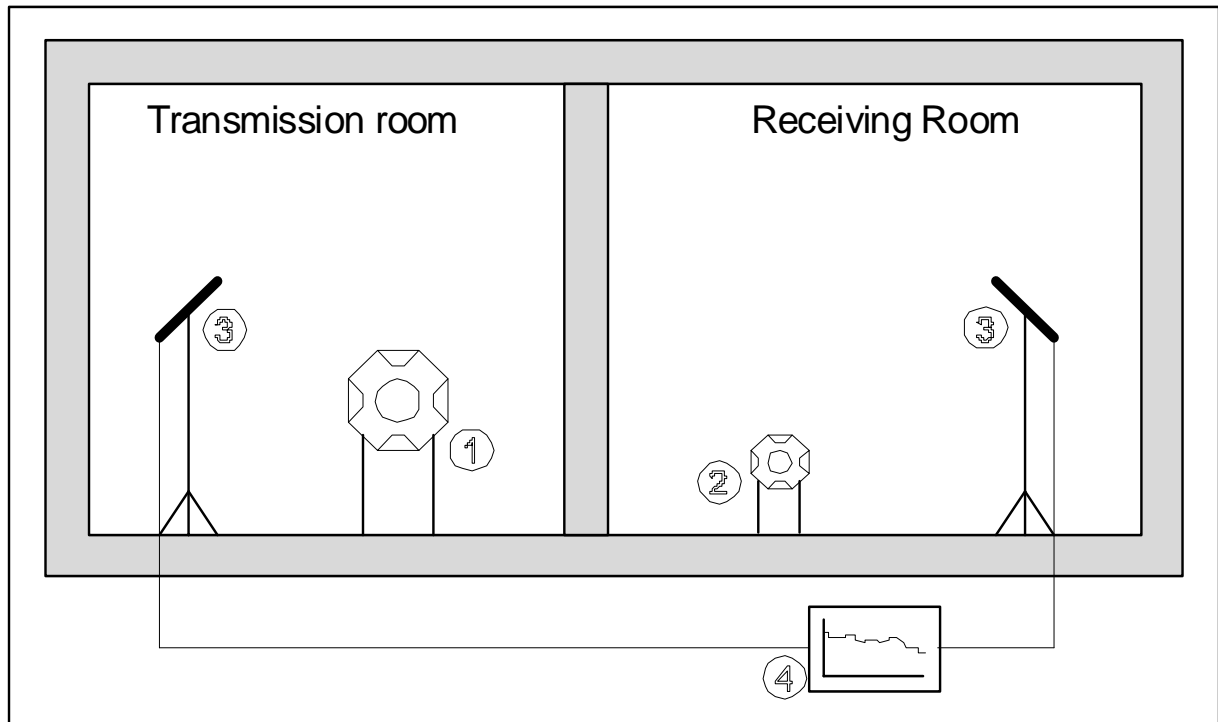
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Description of the Implementation of an Airborne Sound Measurement, evaluated through a Measuring Device with Process Computer

Customer: Sunflex Aluminiumsysteme GmbH, Im Ruttenberge 12, 57482 Wenden

Object: All-glass rotary slide system Sunflex, Type SF 25

1. Measuring Setup



	Unit Designation/ Type	Series number	Date of last check/calibrated until	Last calibration
1	Dodecahedron loudspeakers for radiation of third octave band noise	DL 1	06.06.2007/-	-
2	Dodecahedron loudspeakers for radiation of third octave band noise	DL 2	-	-
3	Condenser microphones: M1: Norsonic, Type 1220 V1: Norsonic, Type 1201 M2: Norsonic, Type 1220 V2: Norsonic, Type 1201	16546 20062 15976 20062	16.01.2007/31.12.2009 16.01.2007/31.12.2009 16.01.2007/31.12.2009 16.01.2007/31.12.2009	15.10.2009 15.10.2009 15.10.2009 15.10.2009
4	Sound level analyzer: Norsonic, Type 121	29837	16.01.2007/31.12.2009	15.10.2009

2. Measurement Implementation

For the determination of the airborne sound insulation, electroacoustic generated third octave band noise is radiated in the transmission room via a dodecahedron loudspeaker. In the frequency range between 50 Hz and 5.000 Hz the margin values generated, are simultaneously measured and recorded in two channels in the transmission and receiving room, via two condenser microphones in third octave band steps. From these values and the rev. time, the sound insulation margins, in the individual frequency bands, are determined according to DIN EN ISO 717. The weighted sound reduction index R_w is determined as an individual value, with the integrated process computer of the sound level analyzer.

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Airborne Sound Measurement according to DIN EN ISO 140-3

Annex 9

Determination of the Airborne Sound Insulation of Components in Laboratory

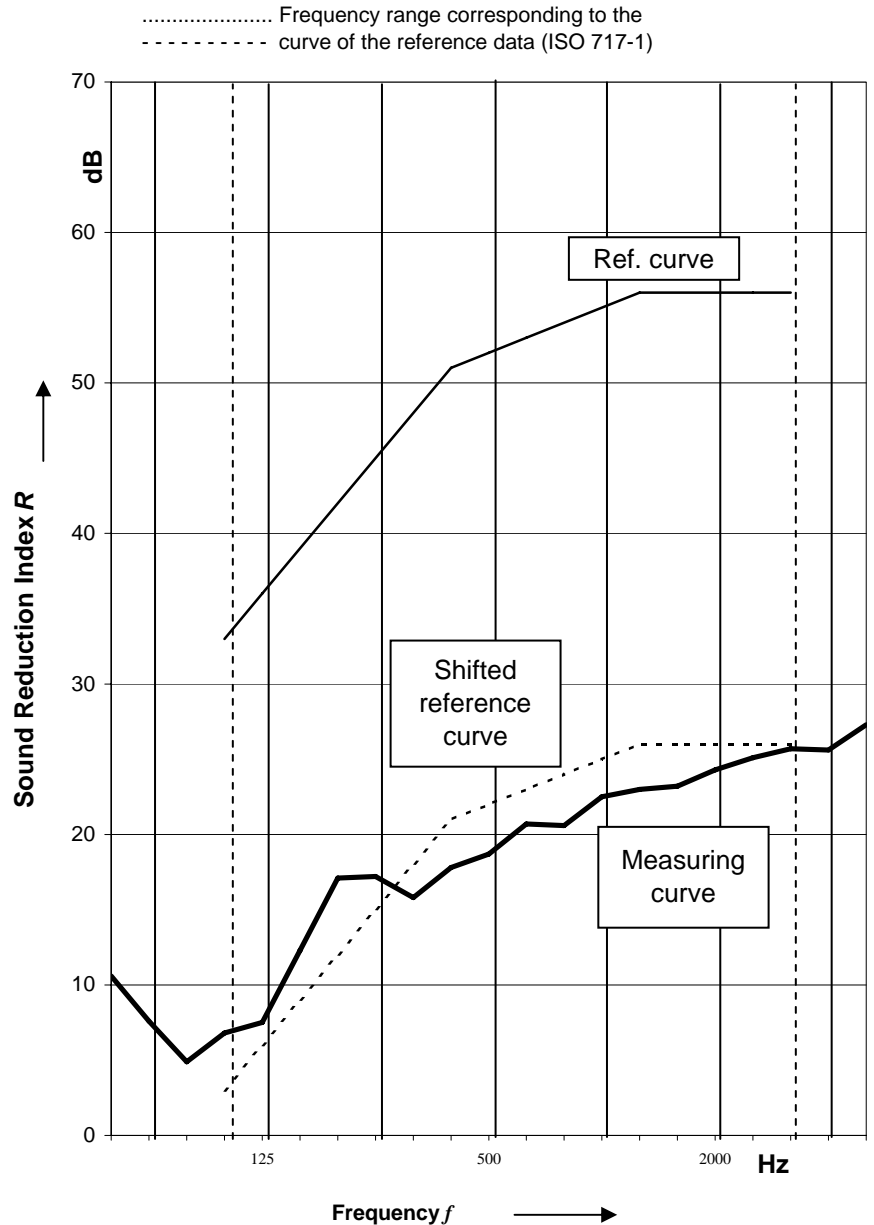
Manufacturer: Sunflex Aluminiumsysteme GmbH Product designation: SF 25
 Customer: Sunflex Aluminiumsysteme GmbH Test rooms: Laboratory
 Test item installed by: Customer Test date: 15.10.2009

Description of the test item: **Measurement 1**
 All-glass rotary slide system Sunflex, Type SF 25, design without vertical gap seal between the individual elements, frameless glazing ESG 8 mm, 5 individual elements, installed in opening width x height = 4.100 mm x 1.600 mm, S = 6,6 m², detailed construction see section 2.2 as well as Annex 1 thru 4 of the test report

Sound Transmission Class:
STC Rating = 22 dB

Surface S test item: 6,6 m²
 Site-specific mass:
 Air temp. in test rooms: 18,3 °C
 Humidity in test rooms: 61,4 %
 Volume transmission room: 81,5 m³
 Volume receiving room: 72,5 m³

Frequency Hz	R Terz dB
50	10,6
63	7,6
80	4,9
100	6,8
125	7,5
160	12,3
200	17,1
250	17,2
315	15,8
400	17,8
500	18,7
630	20,7
800	20,6
1000	22,5
1250	23,0
1600	23,2
2000	24,3
2500	25,1
3150	25,7
4000	25,6
5000	27,3



Weighting acc. to ISO 717-1:

$R_w(C; C_{tr}) = 22 \quad -(1; -3) \text{ dB}$

$C_{50-3150} = -1 \text{ dB} \quad C_{50-5000} = 0 \text{ dB} \quad C_{100-5000} = 20 \text{ dB}$

The determination is based on measurement results which were measured in third octave bands.

$C_{tr50-3150} = -4 \text{ dB} \quad C_{tr50-5000} = -4 \text{ dB} \quad C_{tr100-5000} = 13 \text{ dB}$

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Airborne Sound Measurement according to DIN EN ISO 140-3

Annex 10

Determination of the Airborne Sound Insulation of Components in Laboratory

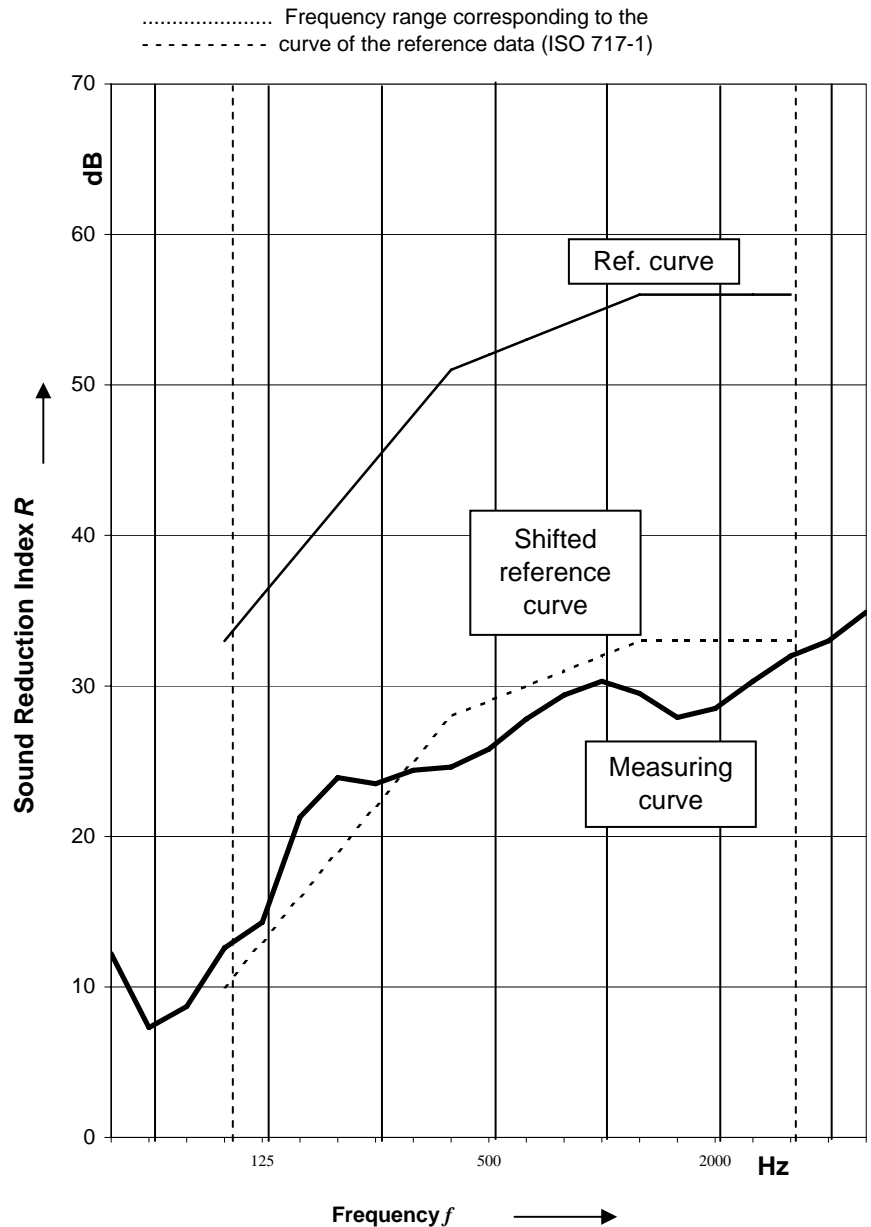
Manufacturer: Sunflex Aluminiumsysteme GmbH Product designation: SF 25 with gap seal
 Customer: Sunflex Aluminiumsysteme GmbH Test rooms: Laboratory
 test item installed by: Customer Test date: 15.10.2009

Description of the test item: **Measurement 2**
 All-glass rotary slide system Sunflex, Type SF 25, design with vertical gap seal between the individual elements, frameless glazing ESG 8 mm, 5 individual elements, installed in opening width x height = 4.100 mm x 1.600 mm, S = 6,6 m², detailed construction see 2.2 as well as Annex 1 thru 4 of the test report

Sound Transmission Class:
STC Rating = 29 dB

Surface S test item: 6,6 m²
 Site-specific mass:
 Air temp. in test rooms: 18,3 °C
 Humidity in test rooms: 0,6 %
 Volume transmission room: 81,5 m³
 Volume receiving room: 72,5 m³

Frequency Hz	R Terz dB
50	12,2
63	7,3
80	8,7
100	12,6
125	14,3
160	21,3
200	23,9
250	23,5
315	24,4
400	24,6
500	25,8
630	27,8
800	29,4
1000	30,3
1250	29,5
1600	27,9
2000	28,5
2500	30,3
3150	32,0
4000	33,0
5000	34,9



Evaluation acc. to ISO 717-1:

$R_w(C; C_{tr}) = 29 \quad -(1; -3) \text{ dB}$ $C_{50-3150} = -1 \text{ dB}$ $C_{50-5000} = -1 \text{ dB}$ $C_{100-5000} = 13 \text{ dB}$

The determination is based on measurement results which were measured in third octave bands. $C_{tr50-3150} = -6 \text{ dB}$ $C_{tr50-5000} = -6 \text{ dB}$ $C_{tr100-5000} = 6 \text{ dB}$

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