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daidalos peutz
laboratory of acoustics

N° 451-TEST
NBN EN ISO 17025:2005

NOISE LAB
REPORT Number A-2019LAB-024-H411-42822_E

Customer : **BSW Berleburger Schaumstoffwerk GmbH**
Am Hilgenacker 24
57319 Bad Berleburg
Germany

Contacts : Client : Enrico Eppner
Noise lab : Volker Spessart

Tests : Laboratory measurement of airborne sound insulation of building elements
Product name : **REGUPOL sonus curve, 15mm**

Reference norm :

NBN EN ISO 10140-2:2010	Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation

Various other related norms:

NBN EN ISO 10140-1:2010	Acoustics - Laboratory measurement of sound insulation of building elements - Part 1: Application rules for specific products
NBN EN ISO 10140-4:2010	Acoustics - Laboratory measurement of sound insulation of building elements - Part 4: Measurement procedures and requirements
NBN EN ISO 10140-5:2010	Acoustics - Laboratory measurement of sound insulation of building elements - Part 5: Requirements for test facilities and equipment
NBN EN 20140-2:1995	Acoustics - Measurement of sound insulation in buildings and of building elements - Part 2: Determination, verification and application of precision data (ISO 140-2:1991)
NBN EN ISO 717-1: 1996	Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation

To perform the above measurements, the laboratory of Daidalos Peutz is accredited by BELAC "The Belgian Accreditation Body"
BELAC is a signatory of all existing MLAs (multilateral agreements) and MRAs (multilateral recognition agreements) of EA (European co-operation for Accreditation), ILAC (International Laboratory Accreditation Cooperation) and IAF (International Accreditation Forum).
In this way, reports and certificates issued by BELAC accredited bodies are internationally accredited.

Date and reference of the request:	10/01/2017	2019LAB-024
Date of receipt of the specimen (s):	28/03/2017	SONH411
Date of tests:	28/03/2017	
Date of preparation of the report:	18/04/2019	

This test report together with its annexes contains : 9 pages and must be multiplies only in its entirety

Technical Manager,

Volker Spessart

Laboratory Engineer,

Karolien Benoit

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MEASURING EQUIPMENT

Sound Sources
Brüel & Kjaer - 4292 : Omni Power Sound Source (+ Brüel & Kjaer - 2716: Power amplifier)
Omnidirectional Sound Source: OUTLINE model GSR Globe Source
Extension Range Subwoofer: OUTLINE model GSS-SP

Microphone and data acquisition system:
Brüel & Kjaer - 4189 : 1/2" free field microphone, 6Hz to 20kHz, prepolarized
Brüel & Kjaer - ZC-0032 : 1/2" microphone preamplifier
Brüel & Kjaer - JP 1041 : dual 10-pole adaptor JP-1041
Brüel & Kjear - 3923 : rotating microphone boom
Brüel & Kjaer - 4231 : Sound calibrator 94&114dB SPL-1000Hz, Fulfils IEC 60942(2003)Class1
Brüel & Kjaer - 2270 : Sound level meter - dual channel instrument (measuring both channels simultaneously)
Conforms with IEC 61672-1 (2002-05) Class 1

Two rotating microphone systems, one in the receiving room, one in the source room

Number of source positions:	3	
Minimum 3m between the different source positions		
Number of microphone positions for each source position:	3	
Microphone position with a rotating microphone		
Number of rotations:	3	
Rotation speed:	16	s/tr
Minimum rotation time:	30	s
Just not a rotation angle <10 ° to the chamber surfaces		

Data processing
Brüel & Kjaer - BZ-5503 : utility software for hand-held analyzers
Brüel & Kjaer - BZ-7229 : dual-channel building acoustics software
Brüel & Kjaer - 7830 :Qualifier Software for reporting of results
A computer with proprietary software

Averaging Time per measurement:	48	s
Number of reverberation time measurements (with graphic control):	27	measurements

Test chambers

Volume source room:	144	m³
Volume receiving room:	51,4	m³
Total partition wall area:	12,00	m²
Surface test opening:	12,00	m²

There is absorption material applied in the test rooms

Partition wall
n/a

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STANDARD METHOD

Airborne sound insulation measurement

The tests were conducted in accordance with the provisions of the test method ISO 10140-2. A detailed description of the test set up has been given in the figures of annex 1 of this report.

The construction to be tested is placed into a test opening between two measuring rooms. In one of the rooms (the so-called sending room) broad band noise is generated by loud-speakers. The test rooms meet the requirements of ISO 10140-5
Both rooms are isolated for vibrations by using a so-called room-in-room construction.

In this sending room as well as in the adjacent room (the "receiving room") the resulting sound pressure level is measured by means of a continuous rotating boom, so the (time- and space-) averaged sound pressure level is determined.

The reverberation time of the receiving room is also measured. The measurement of the reverberation time in the receiving room allows to determined the sound absorption per octave band using the formula Sabine as in the norm ISO 10140-4 and in accordance with ISO 354
The equivalent sound absorption (m²) in the receiving room according to : A = 0,16 V/T in which :

V = volume of the receiving room in cubic meter
T = reverberation time in the receiving room in sec

In ISO 10140-2 the airborne sound insulation of an object is defined as the "sound reduction index R" to be evaluated according to the formula

$$R = L_1 - L_2 + 10 \log (S/A) \quad [dB]$$

met L_1 = sound pressure level in the sending room, in dB (ref 20µPa)
L_2 = sound pressure level in the receiving room, in dB (ref 20µPa)
S = area of the object to be tested, in square metre
A = equivalent sound absorption in the receiving room, in square metre

The above parameters are determined at least in the 1/3 octave bands 100 Hz to 5000 Hz
The environmental conditions in the test rooms (temperature, relative humidity) are measured during the tests

Single-rating number : R_w ($C;C_{tr}$)

The values of the measured airborne sound reduction index of the tested element are drawn-up in the diagram of the annexed data sheet as a function of the frequency (in 1/3 octave bands) and are given in a table.
According to EN ISO 717-1 the weighted sound reduction index Rw and the spectrum adaptation terms C and Ctr for the frequency range from 100 Hz to 3150 Hz can be calculated.

R_w = de 'weighted sound reduction index'
$R_w + C$ = characterize in one number the insulation of the test element against NON-dominant low-frequency noise
$R_w + C_{tr}$ = characterize in one number the insulation of the test element against dominant low-frequency noise

Optionally, these two terms are supplemented by additional adjustment terms (if necessary and measured data are available) on a wider frequency range between 50 Hz and 5000 Hz

Optionally and according other international standards, other single-figure ratings have been calculated and stated.

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SPECIAL MEASUREMENT CONDITIONS

n/a

ACCURACY

The accuracy of the airborne sound insulation as calculated can be expressed in terms of repeatability (tests within one laboratory) and reproducibility (between various laboratories)

Repeatability [r]
When: - two tests are performed on identical test material - within a short period of time - by the same person or team - using the same instrumentation - under unchanged environmental conditions - the probability will be 95% that the difference between the two test results will be less than or equal to r

Reproducibility [R]
When: - two tests are performed on identical test material - in different laboratories - by different person(s) - under different environmental conditions - the probability will be 95% that the difference between the two test results will be less than or equal to R

In ISO 20140-2 there is a statement on the reproducibility R to be expected, based on the results of various inter-laboratory tests.
The reproducibility of the single figure rating Rw is about 3 dB.

The specific value of uncertainty is available on request

ENVIRONMENTAL CONDITIONS during the tests

		Source room	*Receiving room*
Temperature :	T =	19 °C	18,2 °C
Atmospheric pressure :	p =	1018 hPa	1018 hPa
Relative humidity :	h_r =	60 %	63 %

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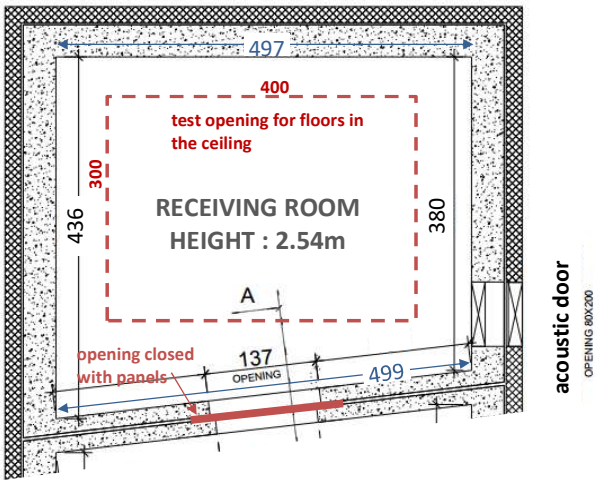
ANNEX 1 : Sound insulation test facilities

The test rooms meet the requirements of ISO 10140-5
Both rooms are isolated for vibrations by using a so called room-in-room construction.



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ANNEX 2: Description test items by manufacturer

The test sample description given by manufacturer is checked visually as good as possible by the laboratory.
The correspondence between the test element and the commercialized product is the sole responsibility of the manufacturer

Description of the test element as a layered structure

	Thickness (mm)	ρ (kg/m³)	m" (kg/m²)	Description of the layer
1	100		2500	prefab reinforced concrete slab
2	15			REGUPOL sonus curve, 15mm
3	140	2300	322	heavyweight standard floor = solid reinforced concrete slab
4				
5				
6				
7				
8				
9				
10				

Total thickness = 255,0 mm

REGUPOL sonus curve, 15mm
It is a floating floor underlayer product for impact sound isolation.
The resilient layer is made from rubber materials.

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ANNEX 3: Technical sheet

The test sample description given by manufacturer is checked visually as good as possible by the laboratory.
The correspondence between the test element and the commercialized product is the sole responsibility of the manufacturer

Please request at supplier

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ANNEX 4: photographs of the test element or the test arrangement

Description of the assembly and/or drawing and/or image

The floating floor underlayer product was placed on the standard concrete floor.
Then a prefab concrete slab was placed on top.
The topfloor had no rigid contact with the test opening construction. Gaps between the topfloor and the test opening were filled-up with sound-absorbing material.

To improve the acoustical sealing of the perimeter edge around the topfloor, additional sandbags were placed onto the gap.
Remark: the sound-absorbing material and sandbags are not part of the floating floor product.

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R

SOUND REDUCTION INDEX according to ISO 10140-2
Laboratory measurement of airborne sound insulation between rooms

Client: **BSW Berleburger Schaumstoffwerk GmbH** Date of test: 28/03/2017

Description of the test setup:
100 mm prefab reinforced concrete slab
15 mm REGUPOL sonus curve
140 mm heavyweight standard floor

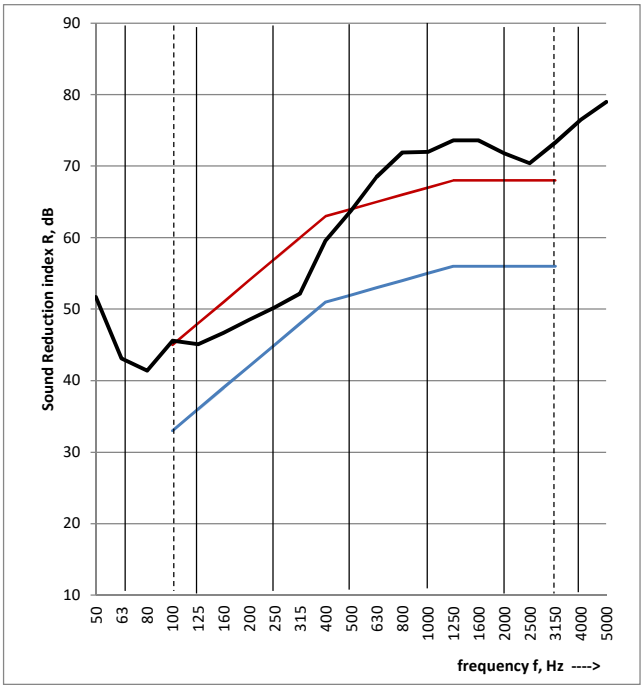
Area S of separating element: 12,00 m²

Receiving room volume: 51,4 m³
Source room volume: 144 m³

frequency Hz	R one third octave dB	(*)	(**)
50	51,7	**b**	
63	43,1		
80	41,4		
100	45,6		
125	**45,1**		
160	46,7		
200	48,5		
250	**50,2**		
315	52,2		
400	59,6		
500	**63,8**		
630	68,5		
800	71,9		
1000	**72,0**	**b**	
1250	73,6		
1600	73,6		
2000	**71,8**		
2500	70,4		
3150	73,3		
4000	**76,5**	**b**	
5000	79,0	B	

B or M : R >= value shown

(*) b : background noise correction used
B : Maximum background noise correction used
(**) m : flanking transmission correction used
M : Maximum flanking transmission correction used



Rating in accordance with ISO 717-1:

R_w ($C;C_{tr}$) = 64 (-2 ; -7) dB $C_{50\text{-}3150}$= -3 dB; $C_{50\text{-}5000}$= -2 dB; $C_{100\text{-}5000}$= -1 dB

Evaluation based on laboratory measurement-results obtained by an engineering method: $C_{tr,50\text{-}3150}$= -8 dB; $C_{tr,50\text{-}5000}$= -8 dB; $C_{tr,100\text{-}5000}$= -7 dB

Measurement no.: SONH411
Date of test report: 18/04/2019
Test institute: Daidalos Peutz
Lab-engineer: Volker Spessart