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Belgium
BTW nr.: BE 0887 763 992

N° 0451-TEST
NBN EN ISO 17025:2005

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NOISE LAB
REPORT Number A-2017_ES_25-H408-42822_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 Soundpad 2 inch (51mm)**

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 eco-scan 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	2017_ES_25
Date of receipt of the specimen (s):	28/03/2017	SONH408
Date of tests:	28/03/2017	
Date of preparation of the report:	4/04/2017	

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	m^3
Volume receiving room:	51,4	m^3
Total partition wall area:	12,00	m^2
Surface test opening:	12,00	m^2

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 (m^2) 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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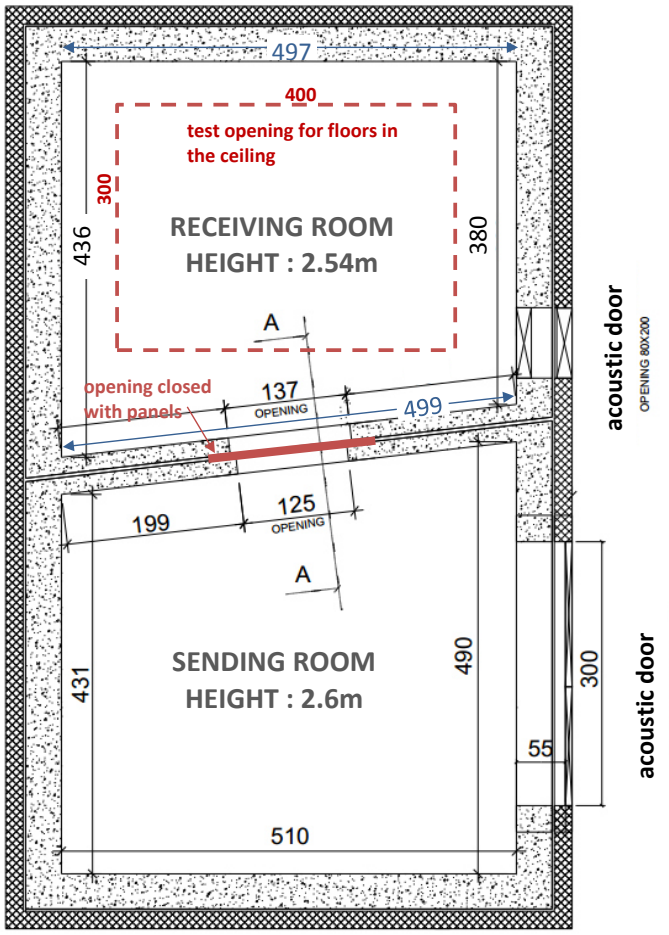
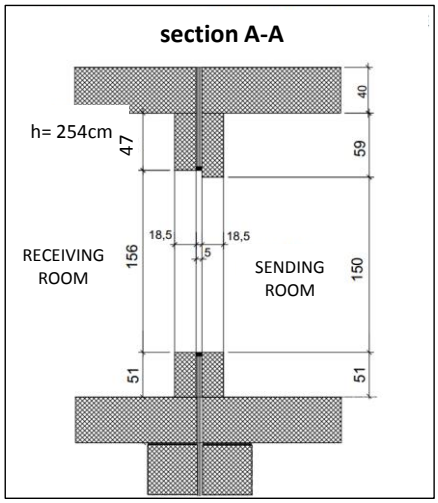
ANNEX 1 : Sound insulation test facilities

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	256	prefab reinforced concrete slab
2	15			OSB plate
3	51			Regupol Soundpad 2 inch (51mm)
4	140	2300	322	heavyweight standard floor = solid reinforced concrete slab
5				
6				
7				
8				
9				
10				

Total thickness = 306,0 mm

Regupol Soundpad 2 inch (51mm)
This product is a pre-manufactured floating floor for airborne and impact sound isolation.
The resilient system consists of rubber pads which are glued onto an OSB wood plate.
The cavity in-between the pads is filled up with mineral wool (30mm).

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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 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 OSB plate
Regupol Soundpad 2 inch (51mm)
140 mm heavyweight standard floor

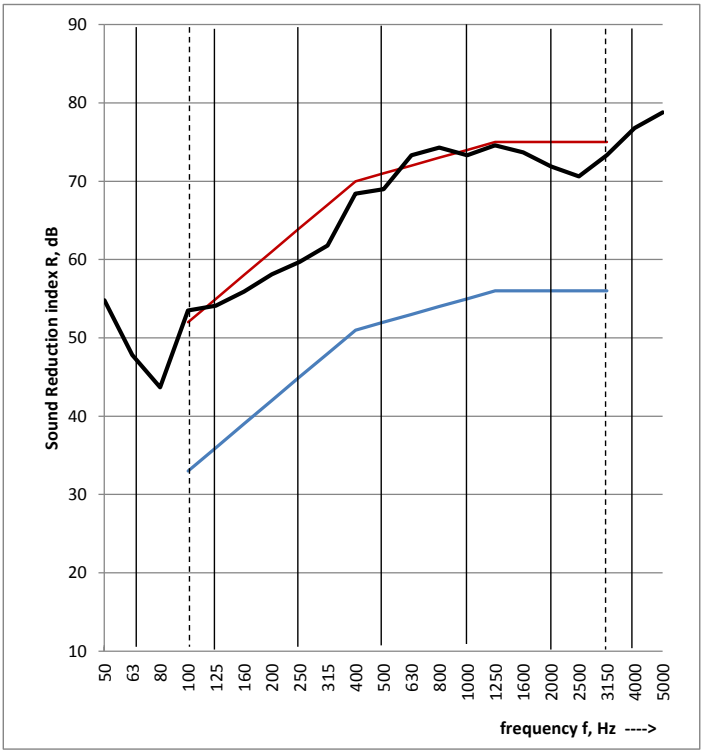
Area S of separating element: 12,00 m²

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

frequency Hz	R one third octave dB	(*)	(**)
50	54,8	**b**	
63	47,8		
80	43,7		
100	53,5		
125	**54,1**		
160	55,9		
200	58,1		
250	**59,7**		
315	61,8		
400	68,4		
500	**69,0**		
630	73,3	b	
800	74,3	b	
1000	**73,3**	**b**	
1250	74,6		
1600	73,7		
2000	**71,9**		
2500	70,6		
3150	73,3		
4000	**76,8**	**b**	
5000	78,8	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}) = **71** **(-2 ; -5)** **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:

$C_{tr,50\text{-}3150}$= -9 dB; $C_{tr,50\text{-}5000}$= -9 dB; $C_{tr,100\text{-}5000}$= -5 dB

Measurement no.: SONH408
Date of test report: 4/04/2017

Test institute: eco-scan bvba
Lab-engineer: Volker Spessart

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Reffering to REPORT Number A-2017_ES_25-H408-42822_E

ANNEX ASTM: results according ASTM standards

This annex to reffering report (see above) is **not** under ISO 17025 accreditation.
It contains the calculated results of the laboratory measurement of airborne sound transmission, according ASTM standards.

Standard method

The airborne sound transmission loss was measured approaching the standard ASTM E90-09.
It was performed as a single direction measurement.

Single rating numbers

Evaluation according to ASTM E413-10 defines the single-number rating, STC (sound transmission class).
The values obtained in accordance with ASTM E90-09 are compared with a reference sound insulation contour at the frequencies of measurement within the range 125Hz to 4000 Hz for measurements in one-third octave bands.
Please see ASTM 413-10 for details of the calculation of the single-value indicator.

Test arrangement

For info concerning the measuring equipment, environmental conditions during the test, test set-up, description of product: see reffering report mentioned above).

MEASUREMENT AND CALCULATION DETAILS

The results as presented here relate only to the tested items and laboratory conditions as described in the reffering report.

Result: Single number rating according to ASTM E413-10

Sound transmission class:

STC =	**71 dB**

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Customer : **BSW Berleburger Schaumstoffwerk GmbH**
Am Hilgenacker 24
57319 Bad Berleburg
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Contacts : Client : Enrico Eppner
Noise lab : Volker Spessart

Tests : **Laboratory measurement of the reduction of impact noise by a floating floor system on a heavyweight standard floor.**
Product name : **Regupol SoundPad 2 inch (51 mm)**

Normative references:

NBN EN ISO 10140-3	Acoustics - Laboratory measurement of sound insulation of building elements - Part 3: Measurements of impact sound insulation

Various other related norms:

NBN EN ISO 10140-1	Acoustics - Laboratory measurement of sound insulation of building elements - Part 1: Application rules for specific products
NBN EN ISO 10140-4	Acoustics - Laboratory measurement of sound insulation of building elements - Part 4: Measurement procedures and requirements
NBN EN ISO 10140-5	Acoustics - Laboratory measurement of sound insulation of building elements - Part 5: Requirements for test facilities and equipment
NBN EN ISO 12999-1	Acoustics - Determination and application of measurement uncertainties in building acoustics - Part 1: Sound insulation
NBN EN ISO 717-2	Acoustics - Rating of sound insulation in buildings and of building elements - Part 2: Impact sound insulation

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Date and reference of the request:	10/01/2017	2017_ES_25
Date of receipt of the specimen (s):	28/03/2017	SONH409
Date of tests:	28/03/2017	
Date of preparation of the report:	4/04/2017	

This test report together with its annexes contains : 13 pages and must be multiplied only in its entirety.

Technical Manager,

Volker Spessart

Laboratory Engineer,

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MEASURING EQUIPMENT

Source signal
Brüel & Kjaer - 4292 : Omni Power Sound Source
Brüel & Kjear - 2716 : Power amplifier
Norsonic Nor277 : Tapping machine conform ISO 10140-5 Annex E

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 - 4231 : Sound calibrator 94&114dB SPL-1000Hz, Fulfils IEC 60942(2003)Class1
Brüel & Kjaer - JP 1041 : dual 10-pole adaptor JP-1041
Brüel & Kjaer - 2270 : Sound level meter - dual channel instrument (measuring both channels simultaneously)
Conforms with IEC 61672-1 (2002-05) Class 1
Brüel & Kjear - 3923 : rotating microphone boom

One rotating microphone system in the receiving room

Number of tapping machine positions:		4
Minimum 0,7m between the different source positions		
Distances to the board of the floor at least 0.5 m		
Random positions and orientation of the tapping machine.		
Number of microphone positions for each tapping machine position:		2
Microphone position with a rotating microphone		
Number of rotations:	3	
Rotation speed:	16	sec/tr
Minimum rotation time:	30 sec	
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 results
A computer with proprietary software

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

Test chambers

Volume receiving room:	51,4	m^3
Reference floor area:	12,00	m^2
Surface test floor :	12,00	m^2

There are diffusers and absorption material applied in the receiving room.

Standard floor
The base floor used is a 140 mm thick solid reinforced concrete slab.
According to ISO 10140-5 Annex C this is the "heavyweight standard floor".

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STANDARD METHOD

The normalised impact sound pressure level Ln and the reduction of sound pressure level (improvement of impact sound insulation) ΔL were measured according to the standard NBN EN ISO 10140-3:2010. A detailed description of the test set up has been given in the figures of annex 1 of this report.

The tests were measured as follows:

- The test sample is mounted onto a heavyweight standard floor, in accordance with the descriptions in the standard NBN EN ISO 10140-1 and 10140-3.

- The standardized (see NBN EN ISO 10140-5:2010 Annex E) tapping machine is positioned in 3 or 4 positions on the test floor (depending on the sample). The impact sound pressure levels are measured in the receiving room below the test floor using a moving microphone.
  A one-third octave band analyser measured the averaged sound levels in the third octave bands from 100 to 5000 Hz. If required, the levels are corrected to account for the background noise. The individual measurements are then averaged energetically for each one-third octave band and converted with the reverberation time measurements to the normalized impact sound pressure level Ln for a receiving room having 10m² of equivalent sound absorption area.

- The normalized impact sound pressure level of the heavyweight standard floor Ln,0 is measured using the identical procedure.

- The normalized impact sound pressure level is calculated according to the following equation:

$$L_n = L_i + 10 \log (A/A_0) \quad [dB]$$

met L_n = The normalized impact sound pressure level, expressed in dB (ref 20µPa)
L_i = the energy average sound pressure level in a one-third octave band in the receiving room when the floor under test is excited by the standardized tapping machine
A_0 = the reference equivalent absorption area (= 10m²)
A = the measured equivalent absorption area

- The temperature, relative humidity and static pressure is also measured in the test rooms.

- The improvement ΔL of the impact sound insulation is calculated from the difference between the weighted impact sound levels of the bare floor without and with the floor covering:

$$\Delta L = L_{n,0} - L_n \quad [dB]$$

met ΔL = The improvement of the impact sound insulation
$L_{n,0}$ = normalized impact sound pressure level of the bare floor
L_n = normalized impact sound pressure level of the bare floor with floor covering

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STANDARD METHOD

Single rating numbers

Evaluation according to EN ISO 717-2 defines single-number quantities, $L_{n,w}$ (C_i) for the impact sound insulation of floors and $\Delta L_w(C_{I,\Delta})$ for the impact sound reduction of floor coverings and floating floors from the results of measurements carried out in accordance with NBN EN ISO 10140-3.
The values obtained in accordance with ISO 10140-3 are compared with reference values at the frequencies of measurement within the range 100Hz to 3150 Hz for measurements in one-third octave bands. The calculation of the single-value indicator can not be summarised in a few lines. See standard NBN EN ISO 717-2 for details.

$L_{n,w}$ = weighted normalized impact sound pressure level
$L_{n,w}+C_i$ = weighted normalized impact sound pressure level corrected with the adaptation term Ci

$C_i = L_{n,sum} - 15 - L_{n,w}$ With $L_{n,sum}$ the summation on an energetic basis for the one-third octave bands in the frequency range 100Hz to 2,5kHz

$$L_{n,sum} = 10 \log \sum_{i=1}^{k} 10^{\frac{L_i}{10}}$$

Calculations of the spectrum adaptation term may additionally be carried out for an enlarged frequency range.
The single-number quantities of impact sound insulation properties of floors, presented as $L_{n,w}$ (C_i)
The single-number quantities of the weighted reduction in impact sound pressure level for floorcoverings, is presented as ΔL_w ($C_{i,\Delta}$) and ΔL_{lin}

The normalized impact sound pressure level of the bare floor

$L_{n,0} = L_i + 10 \log (A/10)$ and $L_{n,0,w}$ ($C_{I,0}$)

The normalized impact sound pressure level of the bare floor with floor covering

$L_n = L_i + 10 \log (A/10)$ and $L_{n,w}$ (C_I)

$\Delta L = L_{n,0} - L_n$ Reduction of impact sound pressure level

To compare the measurement results obtained in different test laboratories, the normalized impact sound level Ln, is referred to the reference floor defined in ISO 717-2 in the following way. The quantity is designated by the index "r" ("reference floor"): $L_{n,r}$

$L_{n,r} = L_{n,r,0} - \Delta L$ and $L_{n,r,w}$ ($C_{I,r}$)

with $L_{n,r,0}$ is the defined normalized impact sound pressure level of the reference floor (see ISO 717-2 point 5.2)

$\Delta L_w = L_{n,r,0,w} - L_{n,r,w} = 78 - L_{n,r,w}$ with $C_{I,\Delta} = C_{I,r,0} - C_{I,r} = -11 - C_{I,r}$

$\Delta L_{lin} = \Delta L_w + C_{I,\Delta}$

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SPECIAL MEASUREMENT CONDITIONS

n/a

ACCURACY

The accuracy of the impact 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 NBN EN ISO 12999-1 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 Lw, ΔLw is about 3 dB.

The specific value of uncertainty is available on request

ENVIRONMENTAL CONDITIONS during the tests

		Source room	*Receiving room*
Temperature :	T =	19,0 °C	18,2 °C
Atmospheric pressure :	p =	1018 hPa	1018 hPa
Relative humidity :	h_r =	60,0 %	63,0 %

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MEASUREMENT AND CALCULATION DETAILS

The results as presented here relate only to the tested items and laboratory conditions as described in this report.

The results of the measurements are presented on the next pages (6 till 9)
- on page 7 : the measurement results for the normalized impact sound level for the bare floor (the naked laboratory floor)
- on page 8 : the measurement results for the normalized impact sound level for the bare floor with floor covering, composition of the test element in annex 2
- on page 9 : the calculation of the reduction of impact sound pressure

The results are given at all frequencies of measurement, both in tabular form and in the form of a graph.

The next table present an overview of the measurements and calculations

f (Hz)	Ln,0 bare floor (dB)	Ln bare floor + floor covering (dB)	ΔL $L_{n,0}$- L_n (dB)	$L_{n,r,0}$ reference floor *according ISO 717-2 / 5.2* (dB)	$L_{n,r}$ reference floor + floor covering $L_{n,r,0}$- ΔL (dB)	
50	50,5	35,1	15,4			
63	57,4	40,2	17,2			
80	61,0	45,1	15,9			
100	57,3	37,5	19,8	67,0	**47,2**	
125	62,7	44,6	18,1	67,5	**49,4**	
160	63,2	40,4	22,8	68,0	**45,2**	
200	67,6	41,5	26,1	68,5	**42,4**	
250	68,2	43,7	24,5	69,0	**44,5**	
315	71,4	42,4	29,0	69,5	**40,5**	
400	70,5	39,7	30,8	70,0	**39,2**	
500	72,1	37,0	35,1	70,5	**35,4**	
630	73,6	39,2	34,4	71,0	**36,6**	
800	73,7	36,7	37,0	71,5	**34,5**	
1000	74,8	36,2	38,6	72,0	**33,4**	
1250	74,8	36,0	38,8	72,0	**33,2**	
1600	75,3	31,2	44,1	72,0	**27,9**	
2000	75,1	24,4	50,7	72,0	**21,3**	
2500	74,4	20,3	54,1	72,0	**17,9**	
3150	73,8	16,6	57,2	72,0	**14,8**	
4000	72,0	14,2	57,8	/	/	
5000	69,3	10,6	58,7	/	/	
ISO	$L_{n,0,w}$	$L_{n,w}$		$L_{n,r,0,w}$	$L_{n,r,w}$	ΔL_w = 78 - Ln,r,w
717-2	**81**	**38**		78	38	**40 dB**
	$C_{I,0}$	C_I		$C_{I,r,0}$	$C_{I,r}$	$C_{I,\Delta}$ = CI,r,0 - CI,r
	-11	**-2**		-11	**1**	**-12 dB**

$\Delta L_{lin} = \Delta L_w + C_{I,\Delta}$
28 dB

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$L_{n,0}$ NORMALIZED IMPACT SOUND PRESSURE LEVEL (of standard floor) in accordance with ISO 10140-3:2010

Client: **BSW Berleburger Schaumstoffwerk GmbH** Date of test: 30/03/2017

Description of the test setup:
The base floor used is a 140 mm thick solid reinforced concrete slab.
According to ISO 10140-5 Annex C this is the "heavyweight standard floor".

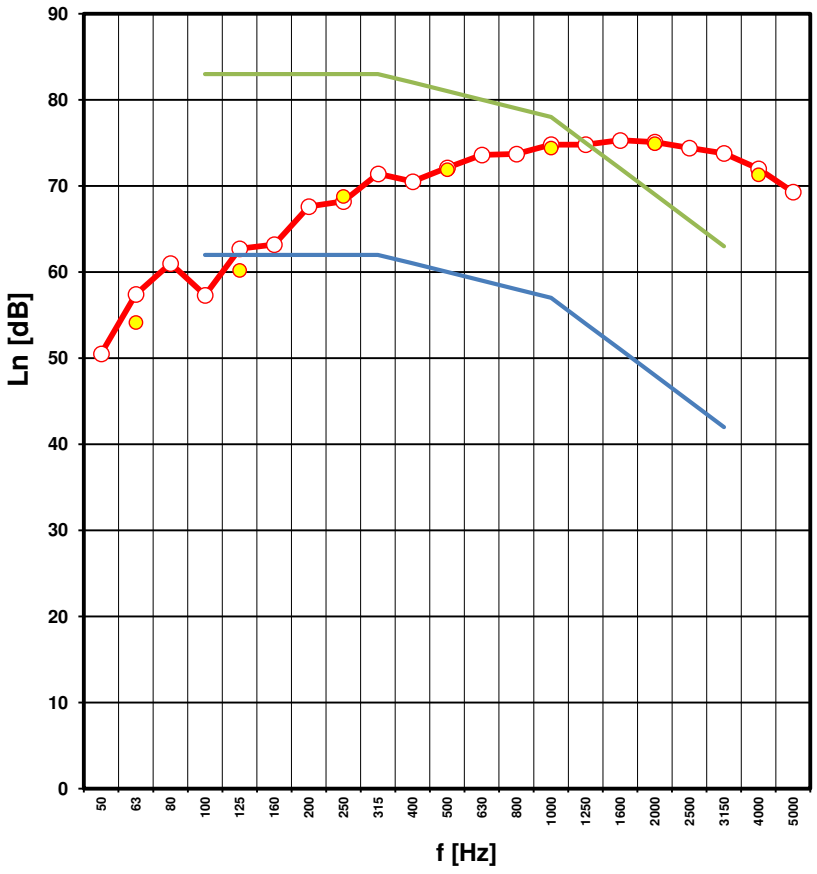
Receiving room volume V: 51,4 m³
Reference floor area : 12,0 m²
Tested floor area : 12,0 m²
Signal : Standard tapping machine with steel-headed hammers.

reference values (according ISO 717-2)
shifted reference values (according ISO 717-2)

f (Hz)	$L_{n,0}$ (dB)	(*)
1/3 octave bands :		
50	50,5	
63	**57,4**	
80	61,0	
100	57,3	
125	**62,7**	
160	63,2	
200	67,6	
250	**68,2**	
315	71,4	
400	70,5	
500	**72,1**	
630	73,6	
800	73,7	
1000	**74,8**	
1250	74,8	
1600	75,3	
2000	**75,1**	
2500	74,4	
3150	73,8	
4000	**72,0**	
5000	69,3	

octave bands :	
63	**54,2**
125	**60,2**
250	**68,8**
500	**71,9**
1000	**74,4**
2000	**74,9**
4000	**71,3**

B: Ln=< value shown



(*) b : background noise correction used
B : Maximum background noise correction used

Rating according to ISO 717-2

Ln,0,w (Ci,0) = 81 (-11) dB

Evaluation based on laboratory measurement results obtained in one-third-octave bands by an engineering method

No.of test report: SONH430
Date: 30/03/2017
Name of test institute: eco-scan bvba
Signature: Volker Spessart

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L_n NORMALIZED IMPACT SOUND PRESSURE LEVEL in accordance with ISO 10140-3:2010

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

Description of the test setup:

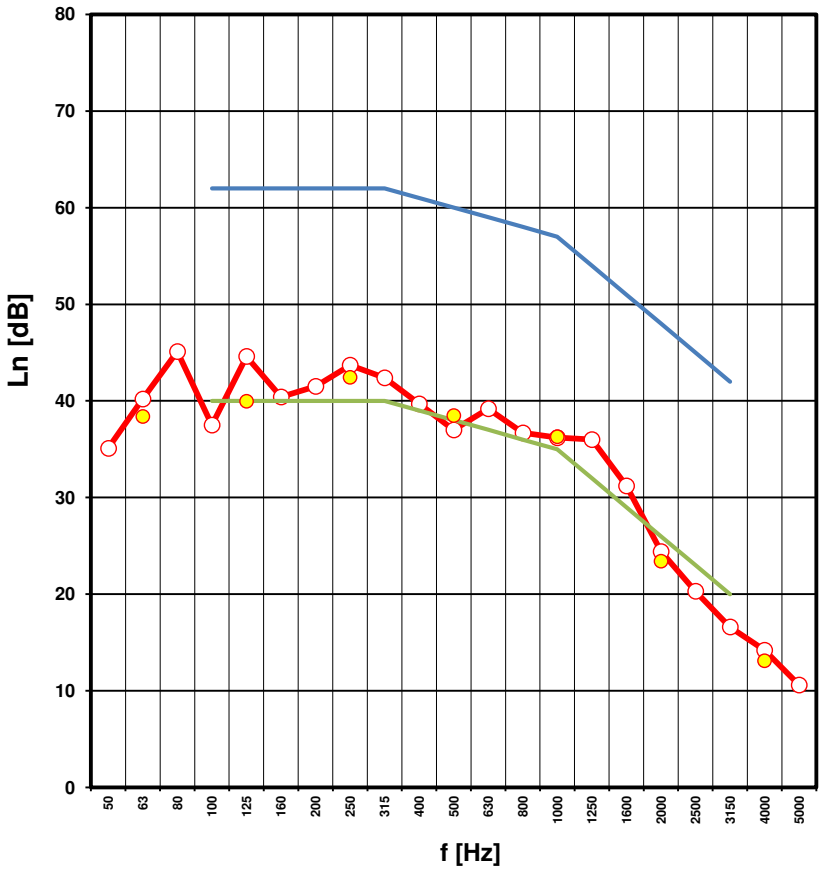
100	mm	prefab reinforced concrete slab
15	mm	OSB plate
51	mm	Regupol SoundPad 2 inch (51 mm)
140	mm	heavyweight standard floor = solid reinforced concrete slab

Receiving room volume V: 51,4 m³
Reference floor area : 12,0 m²
Tested floor area : 12,0 m²
Signal : Standard tapping machine with steel-headed hammers.

f (Hz)	L_n (dB)	(*)
1/3 octave bands :		
50	35,1	b
63	**40,2**	
80	45,1	
100	37,5	
125	**44,6**	
160	40,4	
200	41,5	
250	**43,7**	
315	42,4	
400	39,7	
500	**37,0**	
630	39,2	
800	36,7	
1000	**36,2**	
1250	36,0	
1600	31,2	
2000	**24,4**	
2500	20,3	
3150	16,6	b
4000	**14,2**	B
5000	10,6	B

octave bands :	
63	**38,4**
125	**39,9**
250	**42,4**
500	**38,5**
1000	**36,3**
2000	**23,4**
4000	**13,1**

B: Ln=< value shown



(*) b : background noise correction used
B : Maximum background noise correction used

Rating according to ISO 717-2

Ln,w (Ci) = 38 (-2) dB

Evaluation based on laboratory measurement results obtained in one-third-octave bands by an engineering method

No.of test report: SONH409
Date: 28/03/2017
Name of test institute: eco-scan bvba
Signature: Volker Spessart

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ΔL REDUCTION OF IMPACT SOUND PRESSURE LEVEL BY FLOOR COVERINGS in accordance with ISO 10140-3

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

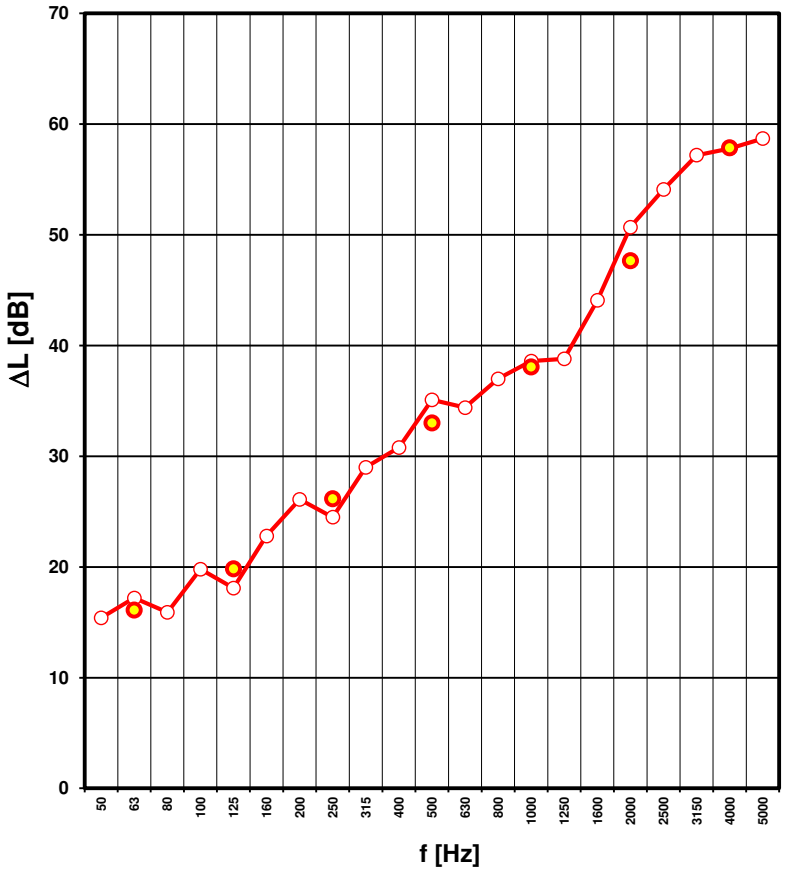
Description of the test setup:

100	mm	prefab reinforced concrete slab
15	mm	OSB plate
51	mm	Regupol SoundPad 2 inch (51 mm)
140	mm	heavyweight standard floor = solid reinforced concrete slab

Receiving room volume V: 51,4 m³
Reference floor area : 12,0 m²
Tested floor area : 12,0 m²
Signal : Standard tapping machine with steel-headed hammers.

f (Hz)	ΔL $=L_{n,0}- L_n$ (dB)
1/3 octave bands :	
50	15,4
63	**17,2**
80	15,9
100	19,8
125	**18,1**
160	22,8
200	26,1
250	**24,5**
315	29,0
400	30,8
500	**35,1**
630	34,4
800	37,0
1000	**38,6**
1250	38,8
1600	44,1
2000	**50,7**
2500	54,1
3150	57,2
4000	**57,8**
5000	58,7

octave bands :	
63	**16,1**
125	**19,8**
250	**26,2**
500	**33,0**
1000	**38,1**
2000	**47,7**
4000	**57,9**



Rating according to ISO 717-2

$\Delta L_w (C_{i,\Delta})$ = **40** (**-12**) **dB**

ΔL_{lin} = 28 dB

Evaluation based on laboratory measurement results obtained in one-third-octave bands by an engineering method

No.of test report: SONH409 Name of test institute: eco-scan bvba
Date: 28/03/2017 Signature: Volker Spessart

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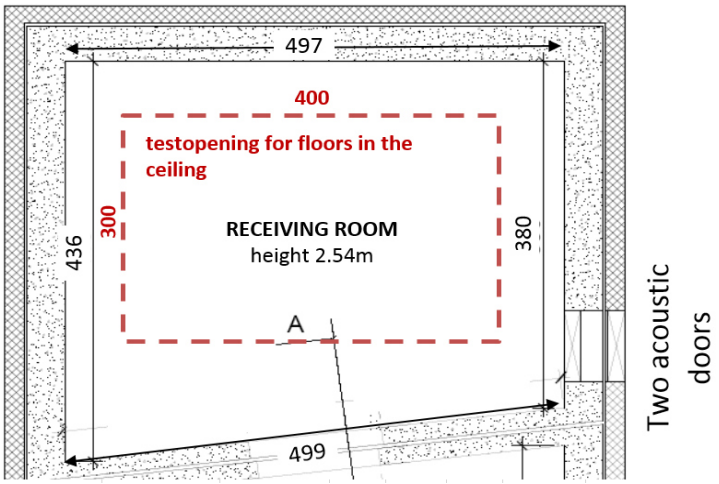
ANNEX 1 : Sound insulation test facilities

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	256	prefab reinforced concrete slab
2	15			OSB plate
3	51			Regupol SoundPad 2 inch (51 mm)
4	140	2300	322	heavyweight standard floor = solid reinforced concrete slab
5				
6				
7				
8				
9				
10				

Total thickness = 306 mm

Regupol SoundPad 2 inch (51 mm)
This product is a pre-manufactured floating floor for airborne and impact sound isolation.
The resilient system consists of rubber pads which are glued onto an OSB wood plate.
The cavity in-between the pads is filled up with mineral wool (30mm).

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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

On request at supplier.

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

Description of the assembly or drawing or photo

The floating floor 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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ANNEX ASTM: results according ASTM standards

This annex to reffering report (see above) is **not** under ISO 17025 accreditation.
It contains the calculated results of the laboratory measurement of airborne sound transmission, according ASTM standards.

Standard method

The normalised impact sound pressure level Ln and the reduction of sound pressure level (improvement of impact sound insulation) were measured approaching to the standards ASTM E492-09 and E2179-03(2009).

Single rating numbers

Evaluation according to ASTM E2179-03(2009) and E989-06(2012) defines single-number ratings, IIC_c for the impact insulation class of floors and ΔIIC for the improvement in impact insulation class of floor coverings and floating floors from the results of measurements carried out in accordance with ASTM E492-09 and E2179-03(2009).
The values obtained in accordance with ASTM E492-09 are compared with reference values at the frequencies of measurement within the range 100Hz to 3150 Hz for measurements in one-third octave bands. The calculation of the single-value indicator can not be summarised in a few lines. See standards ASTM E2179-03(2009) and E989-06(2012).

Test arrangement

For info concerning the measuring equipment, environmental conditions during the test, test set-up, description of product: see reffering report mentioned above).

MEASUREMENT AND CALCULATION DETAILS

The results as presented here relate only to the tested items and laboratory conditions as described in the reffering report.

Results for single number ratings according to following ASTM standards:

According to ASTM E492-09 & E989-06 (2012)

* Impact Insulation Class IIC	**IIC:**	**72 dB**

According to ASTM E2179-03 & E989-06 (2012)

* Impact Insulation Class IICc	**IIC_c:**	**71 dB**
* Improvement in Impact Insulation Class ΔIIC	**ΔIIC:**	**43 dB**