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daidalos peutz
laboratory of acoustics

N° 451-TEST
NBN EN ISO 17025:2017
EA MLA signatory

NOISE LAB
TEST REPORT Number A-2025LAB-015-L056-45832_E

Customer :	**Staenis BV** **Nieuwlandstraat 33** **9870 Olsene** **Belgium**	
Contacts :	Client :	Tom Verstaen
	Noise lab :	Gert-Jan Loobuyck
Tests :	**Laboratory measurement of the improvement of impact sound insulation by a floor covering on a heavyweight standard floor.**	
Product name :	**CircoFloor 200 mm (4P) - Recycork 9 mm - OSB 18 mm**	

Normative references:

NBN EN ISO 10140-3:2021	Acoustics - Laboratory measurement of sound insulation of building elements - Part 3: Measurements of impact sound insulation

Various other related norms:

NBN EN ISO 10140-1:2021	Acoustics - Laboratory measurement of sound insulation of building elements - Part 1: Application rules for specific products
NBN EN ISO 10140-4:2021	Acoustics - Laboratory measurement of sound insulation of building elements - Part 4: Measurement procedures and requirements
NBN EN ISO 10140-5:2021	Acoustics - Laboratory measurement of sound insulation of building elements - Part 5: Requirements for test facilities and equipment
NBN EN ISO 12999-1:2020	Acoustics - Determination and application of measurement uncertainties in building acoustics - Part 1: Sound insulation
NBN EN ISO 717-2:2021	Acoustics - Rating of sound insulation in buildings and of building elements - Part 2: Impact sound insulation

To perform the above measurements, the laboratory of Daidalos Peutz is accredited by BELAC, "The Belgian Accreditation Body", under the certificate nr N°451-TEST. The activities covered by this accreditation certificate are covered by the EA MLA.
BELAC is a signatory of all existing multilateral agreements and recognition agreements of International Laboratory Accreditation Cooperation (ILAC).
In this way, reports issued by BELAC accredited bodies are internationally accredited.

Date and reference of the request:	23/01/2025	2025LAB-015
Date of receipt of the specimen (s):	24/06/2025	SONL056
Date of tests:	24/06/2025	
Date of preparation of the test report:	21/08/2025	

The measurements were carried out at Daidalos Peutz Laboratory for Acoustics at Hooglede, see appendix 1
This test report together with its annexes contains : 13 pages and must be multiplied only in its entirety.

Technical Manager,

Paul Mees

Laboratory Engineer,

Els Meulemans

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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 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 Class 1
Brüel & Kjaer - 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:	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 results
A computer with proprietary software

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

Test chambers

Volume receiving room:	53,34	m³
Reference floor area:	12,00	m²
Surface test floor :	12,00	m²

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 impact sound pressure level (improvement of impact sound insulation) ΔL were measured according to the standard NBN EN ISO 10140-3:2021. 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 10140-5:2021 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 L_n for a receiving room having 10m² of equivalent sound absorption area.
- The normalized impact sound pressure level of the heavyweight standard floor $L_{n,0}$ 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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TEST REPORT Number A-2025LAB-015-L056-45832_E

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 reduction of impact sound pressure level (improvement of impact sound insulation) by floor coverings 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 floor coverings, 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)

corrected for airborne noise transmission according to ISO 10140-2:2021 §5.4

$\Delta L = L_{n,0} - L_n$ 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

The standard ISO 12999-1 contains a statement on the expected reproducibility R, based on the results of various interlaboratory tests.
The standard deviation for the reduction in impact sound pressure level, ΔL_w, obained under reproducibility conditions, σ_R, for the single number value, in accordance with ISO 717-2, from table 7 of standard ISO 12999-1 is 1,1dB.
At present, there are no results available for impact sound insulation at reproducibility conditions. Indicated values are estimates.
The standard deviation for impact sound insulation, $L_{n,w}$, obtained under reproducibility conditions, σ_R, for the single number value, in accordance with ISO 717-2, from table 5 of standard ISO 12999-1 is 1,5dB.
For $L_{n,w}$ is σ_R, from table 5 of standard ISO 12999-1 estimated as 1,5dB

ENVIRONMENTAL CONDITIONS during the tests

		Source room	*Receiving room*
Temperature :	T =	22,2 °C	20,5 °C
Atmospheric pressure :	p =	1011,1 hPa	1010,6 hPa
Relative humidity :	h_r =	59,1 %	70,1 %

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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 test 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)	$L_{n,0}$ bare floor (dB)	L_n 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	43,7	43,5	0,2			
63	**57,6**	**52,8**	4,8			
80	64,5	61,1	3,4			
100	63,5	59,2	4,3	67,0	**62,7**	
125	**63,7**	**57,7**	6,0	67,5	**61,5**	
160	64,4	55,5	8,9	68,0	**59,1**	
200	66,1	52,4	13,7	68,5	**54,8**	
250	**66,2**	**50,4**	15,8	69,0	**53,2**	
315	66,1	47,3	18,8	69,5	**50,7**	
400	66,0	44,7	21,3	70,0	**48,7**	
500	**66,7**	**43,4**	23,3	70,5	**47,2**	
630	67,2	41,2	26,0	71,0	**45,0**	
800	69,0	37,2	31,8	71,5	**39,7**	
1000	**69,3**	**33,6**	35,7	72,0	**36,3**	
1250	70,3	30,7	39,6	72,0	**32,4**	
1600	70,6	27,6	43,0	72,0	**29,0**	
2000	**69,5**	**22,1**	47,4	72,0	**24,6**	
2500	69,4	13,7	55,7	72,0	**16,3**	
3150	68,7	6,1	62,6	72,0	**9,4**	
4000	**66,5**	**9,4**	57,1	/	**/**	
5000	63,6	7,5	56,1	/	**/**	

ISO 717-2	$L_{n,0,w}$	$L_{n,w}$		$L_{n,r,0,w}$	$L_{n,r,w}$	$\Delta L_w = 78 - L_{n,r,w}$
	76	**47**		78	50	**28 dB**
	$C_{I,0}$	C_I		$C_{I,r,0}$	$C_{I,r}$	$C_{I,\Delta} = C_{I,r,0} - C_{I,r}$
	-11	**1**		-11	**2**	**-13 dB**

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

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$L_{n,0}$ NORMALIZED IMPACT SOUND PRESSURE LEVEL (of standard floor) in accordance with ISO 10140-3:2021

Client: **Staenis BV** Date of test: 30/06/2025

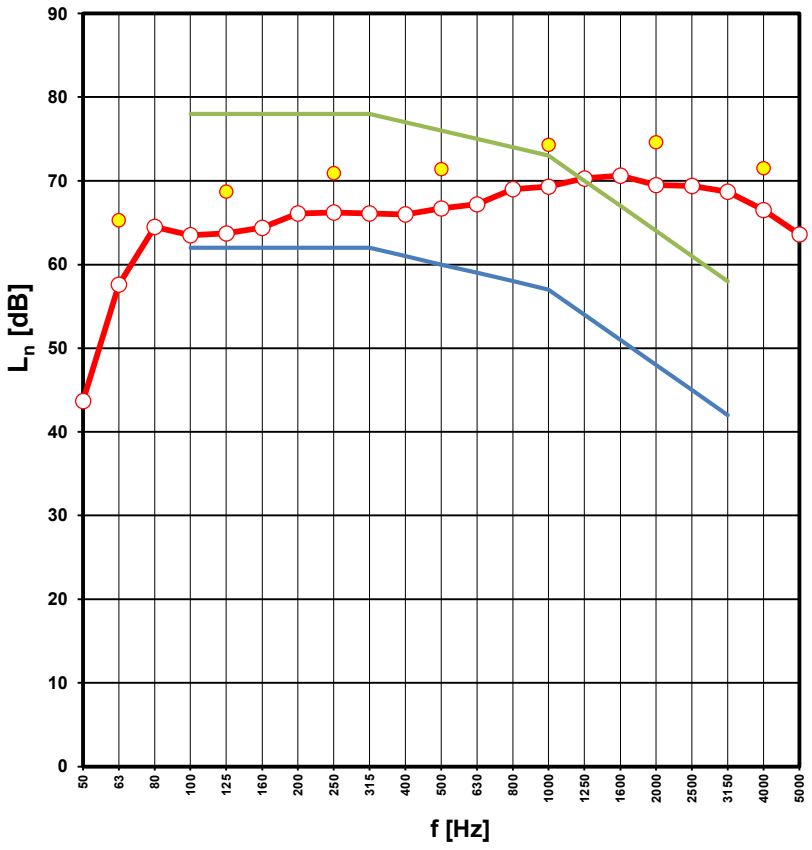
Description of the test setup:
The base floor used is a 140 mm thick solid reinforced concrete slab.
According to ISO 10140-5 Annex C this is the "heavyweight standard floor".

Receiving room volume V: 53,3 m³
Reference floor area : 12,0 m²
Tested floor area : 12,0 m²
Signal : Standard tapping machine with steel-headed hammers.

f (Hz)	$L_{n,0}$ (dB)	(*)
1/3 octave bands :		
50	43,7	
63	**57,6**	
80	64,5	
100	63,5	
125	**63,7**	
160	64,4	
200	66,1	
250	**66,2**	
315	66,1	
400	66,0	
500	**66,7**	
630	67,2	
800	69,0	
1000	**69,3**	
1250	70,3	
1600	70,6	
2000	**69,5**	
2500	69,4	
3150	68,7	
4000	**66,5**	
5000	63,6	

octave bands :	
63	**65,3**
125	**68,7**
250	**70,9**
500	**71,4**
1000	**74,3**
2000	**74,6**
4000	**71,5**

B: L_n=< value shown



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

Rating according to ISO 717-2

$L_{n,0,w}$ ($C_{i,0}$) = 76 (-11) dB

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

No.of test report: SONL073
Date: 30/06/2025
Name of test institute: Daidalos Peutz Laboratory of Acoustics, Hooglede, Belgium
Signature: Gert-Jan Loobuyck

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TEST REPORT Number A-2025LAB-015-L056-45832_E

L_n NORMALIZED IMPACT SOUND PRESSURE LEVEL in accordance with ISO 10140-3:2021

Client: **Staenis BV** Date of test: 24/06/2025

Description of the test setup:

18 mm	AGEPAN OSB 3 Ecoboard, 18 mm: ±11.3 kg/m²
182 mm	CircoFloor system 182 mm: 4-point support (4P) infill material: Recycork 9 mm, ±138.4 kg/m³
140 mm	heavyweight standard floor = solid reinforced concrete slab

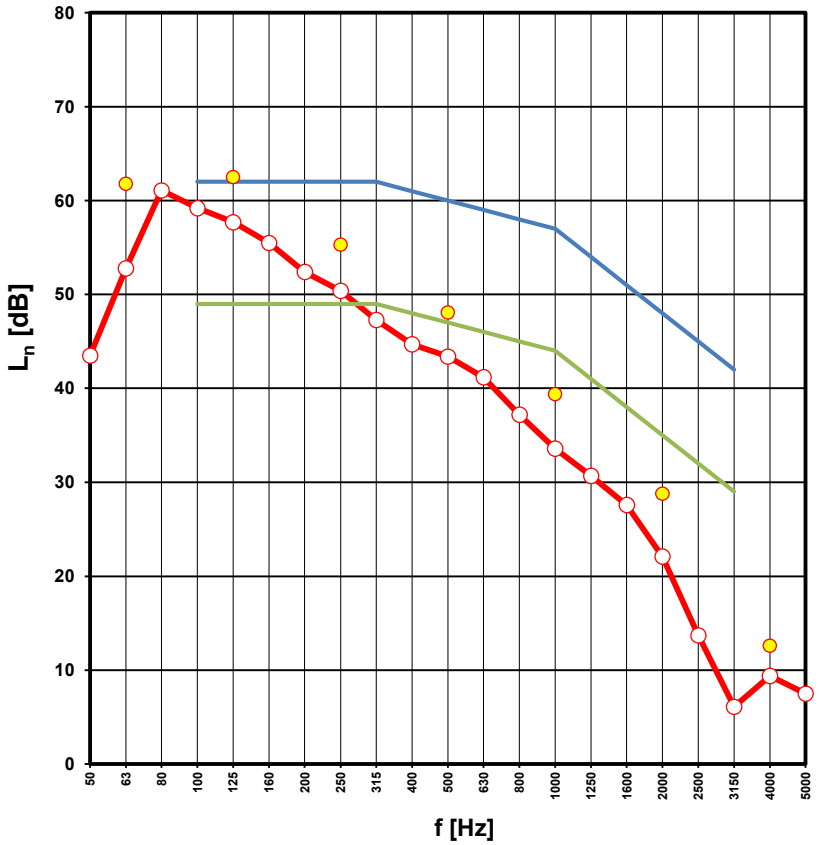
Receiving room volume V: 53,3 m³
Reference floor area : 12,0 m²
Tested floor area : 12,0 m²
Signal : Standard tapping machine with steel-headed hammers.

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

f (Hz)	L_n (dB)	(*)	(**)
1/3 octave bands :			
50	43,5		
63	**52,8**		
80	61,1		
100	59,2		
125	**57,7**		
160	55,5		
200	52,4		
250	**50,4**		
315	47,3		
400	44,7		
500	**43,4**		
630	41,2		
800	37,2		
1000	**33,6**		
1250	30,7		
1600	27,6		
2000	**22,1**		
2500	13,7	b	d
3150	6,1	B	d
4000	**9,4**	B	
5000	7,5	B	

octave bands :	
63	**61,8**
125	**62,5**
250	**55,3**
500	**48,1**
1000	**39,4**
2000	**28,8**
4000	**12,6**

B: L_n=< value shown



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

(**) d : correction for airborne sound transmission in accordance with ISO10140-3:2021 §5.4
D: sound transmission is dominated by airborne sound and impact sound insulation cannot be measured correctly (ISO 10140-3:2021 §5.4)

Rating according to ISO 717-2

$L_{n,w}$ (C_i) = 47 (1) dB

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

No.of test report: SONL056
Date: 24/06/2025
Name of test institute: Daidalos Peutz Laboratory of Acoustics, Hooglede, Belgium
Signature: Gert-Jan Loobuyck

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ΔL REDUCTION OF IMPACT SOUND PRESSURE LEVEL BY FLOOR COVERINGS in accordance with ISO 10140-3:2021

Client: **Staenis BV** Date of test: 24/06/2025

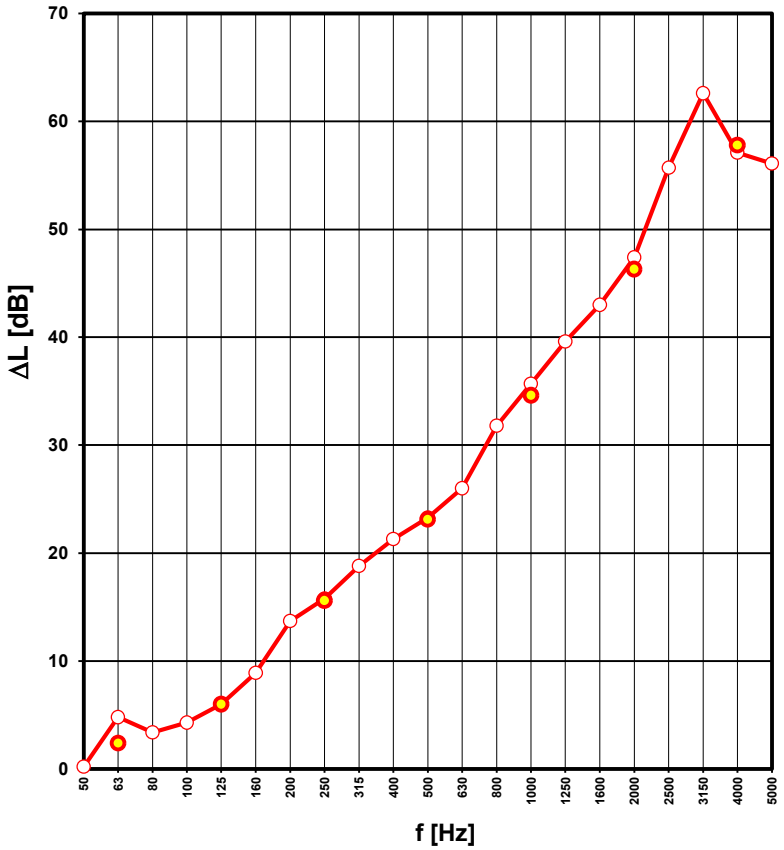
Description of the test setup:

18	mm	AGEPAN OSB 3 Ecoboard, 18 mm: ±11.3 kg/m²
182	mm	CircoFloor system 182 mm: 4-point support (4P) infill material: Recycork 9 mm, ±138.4 kg/m³
140	mm	heavyweight standard floor = solid reinforced concrete slab

Receiving room volume V: 53,3 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	0,2
63	**4,8**
80	3,4
100	4,3
125	**6,0**
160	8,9
200	13,7
250	**15,8**
315	18,8
400	21,3
500	**23,3**
630	26,0
800	31,8
1000	**35,7**
1250	39,6
1600	43,0
2000	**47,4**
2500	55,7
3150	62,6
4000	**57,1**
5000	56,1

octave bands :	
63	**2,4**
125	**6,0**
250	**15,6**
500	**23,1**
1000	**34,6**
2000	**46,3**
4000	**57,8**



Rating according to ISO 717-2

$\Delta L_w (C_{i,\Delta})$ = **28** (**-13**) **dB**

ΔL_{lin} = 15 dB

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

No.of test report:	SONL056	Name of test institute:	Daidalos Peutz Laboratory of Acoustics, Hooglede, Belgium
Date:	24/06/2025	Signature:	Gert-Jan Loobuyck

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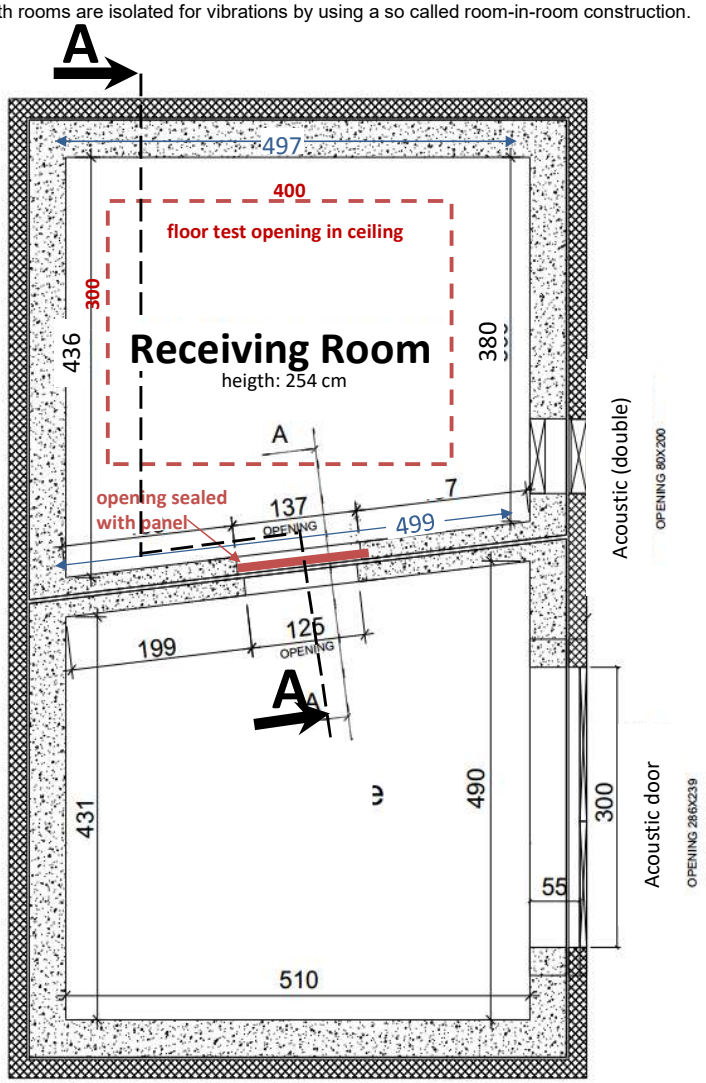
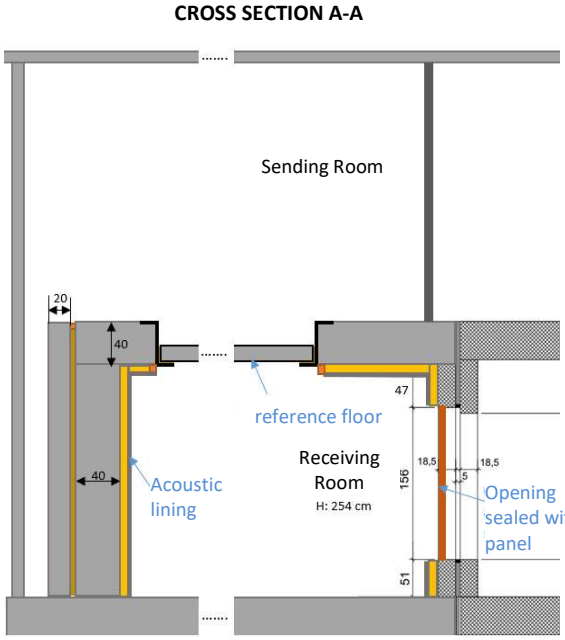
ANNEX 1 : Sound insulation test facilities at Daidalos Peutz Laboratory of Acoustics

Daidalos Peutz Laboratory of Acoustics, Diksmuidesteenweg 17B/1, B-8830 Hooglede, Belgium

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 the manufacturer is checked visually as good as possible by the laboratory.
Sampling was not carried out by the laboratory; therefore, the results in this report apply solely to the sample as received.
Responsibility for ensuring that the tested product is equivalent to the commercialized product rests entirely with the applicant.

Description of the test element as a layered structure

Layer	Thickness (mm)	ρ (kg/m³)	m" (kg/m²)	Description of the layer
1	18	625,6*	11,3*	AGEPAN OSB 3 Ecoboard, 18 mm: ±11.3 kg/m²
2a	182		10	CircoFloor system 182 mm: 4-point support (4P)
2b		138,4*		infill material: Recycork 9 mm, ±138.4 kg/m³
3	140	2300	322	heavyweight standard floor = solid reinforced concrete slab

Height of the Staenis floor assembly: 200 mm
Total height inluding 140 mm concrete base floor: 340 mm

** indicative measurement in the laboratory*

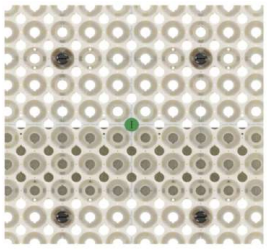
CircoFloor 200 mm (4P) - Recycork 9 mm - OSB 18 mm

Layer 1:
OSB 18 mm : Indicative surface mass density (laboratory measurement): ±11.3 kg/m²
Type: AGEPAN OSB 3 Ecoboard (mechanically fixed to the CircoFloor system using ≈ 13 screws/ m²)
Layer 2a:
CircoFloor System 182 mm:
Composed of cup-shaped panels interlocked in opposing orientations, forming a single structural panel with a total height of 88 mm.
Material: Polypropylene (PP)
The CircoFloor system was leveled using the 147 mm height-adjustable (PP) supports ⌀28 mm,
screwed in the structural panels, to achieve a total system height of 182 mm.
The supports are arranged in a 4-point support configuration, positioned at the square intersections (39 cm c/c).
All adjustment supports are in direct mechanical contact with the laboratory base floor.
Total contact point connections with the test floor (3000 mm x 4000 mm): 98
This corresponds to 88 primary support points at the square intersections (≈7 supports/m²)
plus 10 additional supports along one longitudinal side of the test floor to provide extra support on that side.
Locking PP screw 42 mm (green): to secure the interlocked cup-shaped panels. This screw does not make contact with the base floor.
Layer 2b:
Infill material: Recycork 9 mm
Type: Granular insulation material composed of recycled cork.
Granule size: 0.5 mm – 9 mm.
Indicative bulk density (laboratory measurement): ±138.4 kg/m³.
Decoupling (contact with structural elements):
A resilient edge strip (5 mm thick, 200 mm high) was bonded to the vertical edges of the test opening,
to prevent the Staenis floor assembly making rigid contact with the surrounding structure.
Sealing:
A flexible sealant (Perennator) was used to seal the perimeter joint (±5 mm) between the 18 mm OSB top plate and the surrounding structure.

More detailed information regarding the installation method of the CircoFloor system can be obtained from Staenis.

structural interlocking panel 39 cm x 39 cm

4-point support configuration



example/section of the CircoFloor system with OSB covering

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laboratory of acoustics

N° 451-TEST
NBN EN ISO 17025:2017
EA MLA signatory

NOISE LAB
TEST REPORT Number A-2025LAB-015-L056-45832_E

ANNEX 3: Technical sheet

The test sample description given by the manufacturer is checked visually as good as possible by the laboratory.
Sampling was not carried out by the laboratory; therefore, the results in this report apply solely to the sample as received.
Responsibility for ensuring that the tested product is equivalent to the commercialized product rests entirely with the applicant.

Further product information can be obtained from ***Staenis BV***

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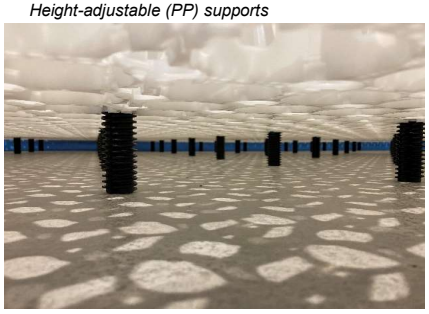
ANNEX 4: photographs of the test element or the test arrangement

Description of the assembly or drawing or photo

The assembly was carried out by the manufacturer, Staenis, fully in accordance with the manufacturer's instructions.
The correct height of the CircoFloor system was set using a line laser and a reference point to ensure proper adjustment.
The laboratory verified whether the specified floor build-up height was correctly applied.
The floor was classified according to annex H.2.2, ISO 10140-1: Category II - Large specimen.
This category includes floor coverings of which at least one constituent is rigid.
The floorcovering measures ±3.0m x 4.0 m and covers at least 10 m² with a smaller dimension of at least 2.3m.
The tapping machine was placed in 4 different positions on the test floor.
The same tapping machine positions were used on the uncovered concrete reference floor.

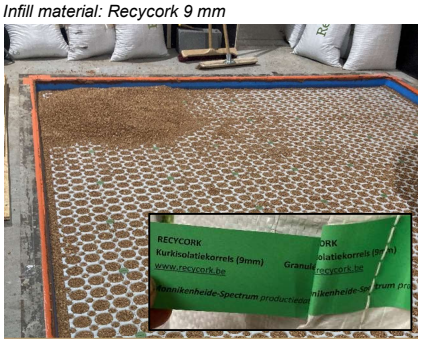
Installation of the CircoFloor interlocking panels

Height-adjustable (PP) supports



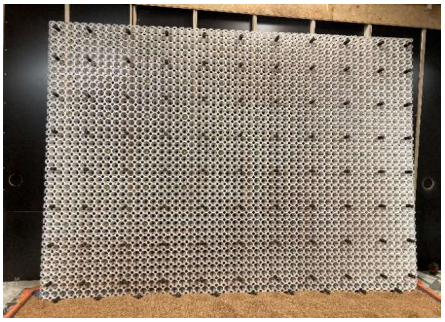
Installation height: 182 mm

Infill material: Recycork 9 mm

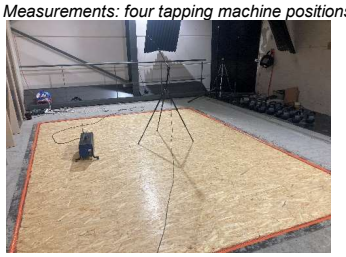


4-point support configuration

Backside of the full CircoFloor structure (12m²) with 98 supports



Measurements: four tapping machine positions on the test floor



perimeter joint sealed with Perennator