

Daidalos Peutz bouwfysisch ingenieursbureau
 Vital Decosterstraat 67A – bus 1
 B-3000 Leuven
 Belgium
 VAT: BE 0454.276.239
www.daidalospeutz.be



NBN EN ISO 17025:2017
 EA MLA signatory

NOISE LAB
TEST REPORT Number A-2025LAB-015-L068-45835_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 140 mm (4P) - Pearls Graphite EPS - Fermacell 2E22
 Renewworks

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	SONL068
Date of tests:	27/06/2025	
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

NOISE LAB

TEST REPORT Number **A-2025LAB-015-L068-45835_E**

STANDARD METHOD

The normalised impact sound pressure level L_n 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:

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

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 (= 10m ²)
	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:

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

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 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 C_i

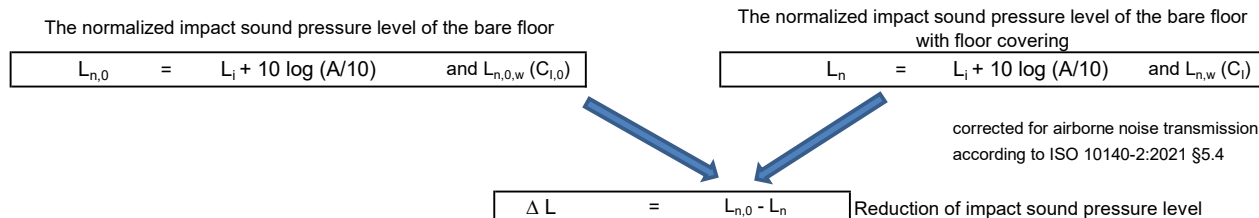
C_i = $L_{n,sum} - 15 - L_{n,w}$ With $L_{n,sum}$ the summation on an energetic basis for the one-third octave bands in the frequency range 100Hz to 2,5kHz

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

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 $\Delta L_w(C_{i,\Delta})$ and ΔL_{lin}



To compare the measurement results obtained in different test laboratories, the normalized impact sound level L_n , 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"): $L_{n,r}$

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

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

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

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

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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 , obtained 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

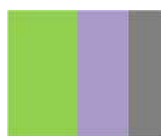
ENVIRONMENTAL CONDITIONS during the tests

Temperature :

Atmospheric pressure :

Relative humidity :

	Source room	Receiving room
T =	22,3 °C	20,4 °C
p =	1018,2 hPa	1017,7 hPa
h _r =	62,4 %	70,9 %



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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	L _{n,0} bare floor	L _n bare floor + floor covering	ΔL L _{n,0} - L _n	L _{n,r,0} reference floor according ISO 717-2 / 5.2	L _{n,r} reference floor + floor covering L _{n,r,0} - ΔL	
(Hz)	(dB)	(dB)	(dB)	(dB)	(dB)	
50	43,9	45,6	-1,7			
63	57,0	58,4	-1,4			
80	65,2	62,7	2,5			
100	64,2	58,7	5,5	67,0	61,5	
125	63,9	56,9	7,0	67,5	60,5	
160	64,8	54,2	10,6	68,0	57,4	
200	65,8	53,8	12,0	68,5	56,5	
250	66,2	52,2	14,0	69,0	55,0	
315	66,3	51,3	15,0	69,5	54,5	
400	66,2	49,4	16,8	70,0	53,2	
500	67,4	47,3	20,1	70,5	50,4	
630	68,6	45,6	23,0	71,0	48,0	
800	69,8	42,9	26,9	71,5	44,6	
1000	70,5	40,0	30,5	72,0	41,5	
1250	71,0	35,5	35,5	72,0	36,5	
1600	70,9	32,8	38,1	72,0	33,9	
2000	69,7	29,5	40,2	72,0	31,8	
2500	69,7	26,5	43,2	72,0	28,8	
3150	68,9	18,9	50,0	72,0	22,0	
4000	66,6	10,5	56,1	/	/	
5000	63,6	7,8	55,8	/	/	
ISO 717-2	L _{n,0,w}	L _{n,w}		L _{n,r,0,w}	L _{n,r,w}	ΔL _w = 78 - L _{n,r,w}
	76	48		78	51	27 dB
	C _{l,0}	C _l		C _{l,r,0}	C _{l,r}	C _{l,Δ} = C _{l,r,0} - C _{l,r}
	-11	1		-11	1	-12 dB

ΔL _{lin} = ΔL _w + C _{l,Δ}
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.

reference values (according ISO 717-2)

shifted reference values (according ISO 717-2)

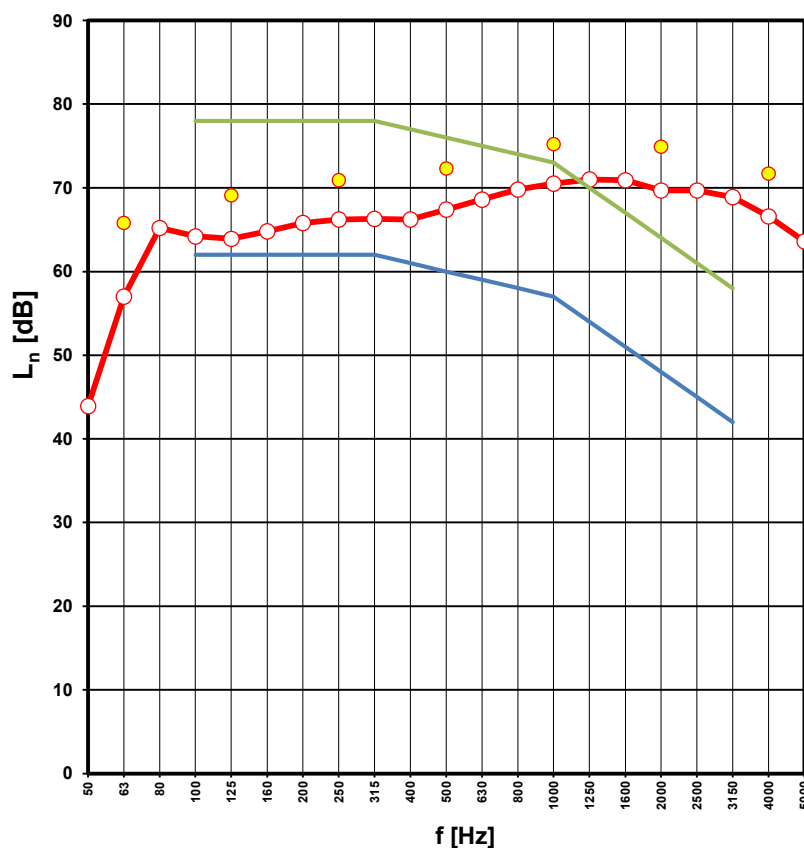
f	$L_{n,0}$	(*)
(Hz)	(dB)	
1/3 octave bands :		
50	43,9	
63	57,0	
80	65,2	
100	64,2	
125	63,9	
160	64,8	
200	65,8	
250	66,2	
315	66,3	
400	66,2	
500	67,4	
630	68,6	
800	69,8	
1000	70,5	
1250	71,0	
1600	70,9	
2000	69,7	
2500	69,7	
3150	68,9	
4000	66,6	
5000	63,6	

octave bands :	
63	65,8
125	69,1
250	70,9
500	72,3
1000	75,2
2000	74,9
4000	71,7

B: L_n = value shown

(*) b : background noise correction used

B : Maximum background noise correction used



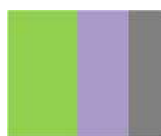
Rating according to ISO 717-2

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

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

No. of test report: SONL073 (2)
 Date: 30/06/2025

Name of test institute: Daidalos Peutz Laboratory of Acoustics, Hoogdele, Belgium
 Signature: Gert-Jan Loobuyck



NOISE LAB
TEST REPORT Number A-2025LAB-015-L068-45835_E

L_n

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

Client: Staenis BV

Date of test: 27/06/2025

Description of the test setup:

25 mm Fermacell 2E22 gypsum fiberboards, 25 mm: ±29.7 kg/m²
115 mm CircoFloor system 115 mm: 4-point support (4P)
infill material: Pearls Graphite EPS, ±13.4 kg/m³ Renewworks
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	45,6		
63	58,4		
80	62,7		
100	58,7		
125	56,9		
160	54,2		
200	53,8		
250	52,2		
315	51,3		
400	49,4		
500	47,3		
630	45,6		
800	42,9		
1000	40,0		
1250	35,5		
1600	32,8		
2000	29,5		
2500	26,5		
3150	18,9	b	
4000	10,5	B	d
5000	7,8	B	

octave bands :

63	64,1
125	61,7
250	57,3
500	52,5
1000	45,2
2000	35,1
4000	19,8

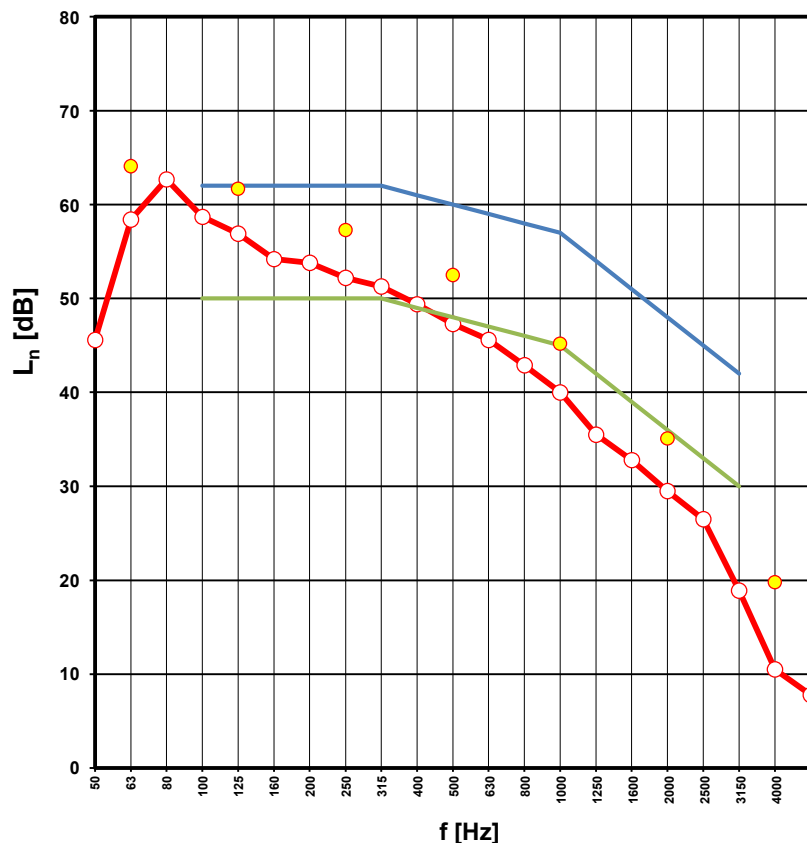
B: L_n < value shown

(*) 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) = 48 (1) dB

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

No. of test report: SONL068
Date: 27/06/2025

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-L068-45835_E



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

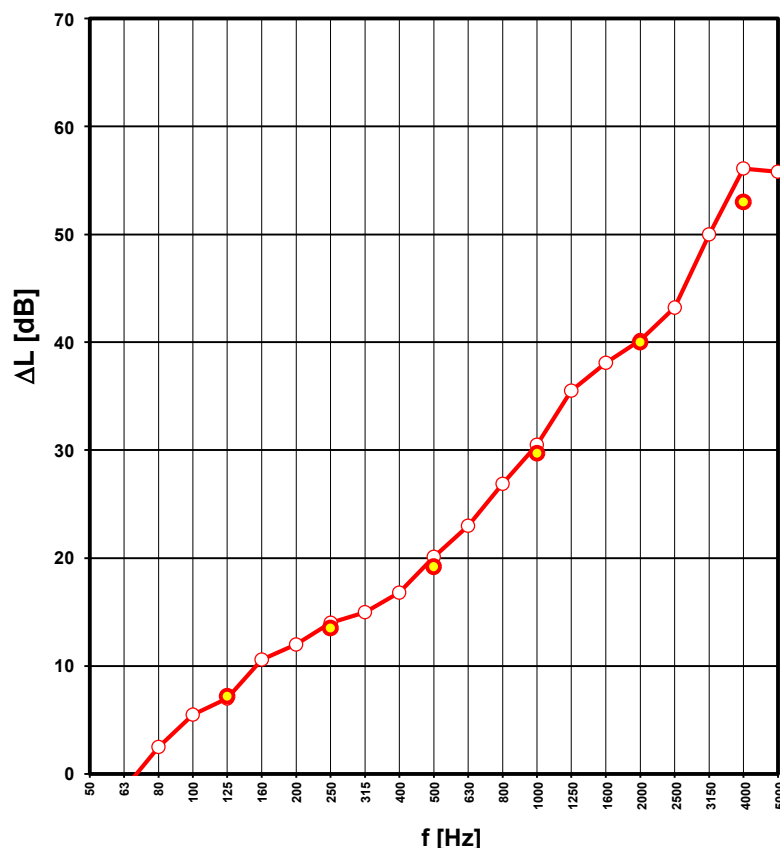
Client: Staenis BV

Date of test: 27/06/2025

Description of the test setup:

25 mm Fermacell 2E22 gypsum fiberboards, 25 mm: $\pm 29.7 \text{ kg/m}^2$
 115 mm CircoFloor system 115 mm: 4-point support (4P)
 infill material: Pearls Graphite EPS, $\pm 13.4 \text{ kg/m}^3$ Renewworks
 140 mm heavyweight standard floor = solid reinforced concrete slab
 Receiving room volume V: $53,3 \text{ m}^3$
 Reference floor area : $12,0 \text{ m}^2$
 Tested floor area : $12,0 \text{ m}^2$
 Signal : Standard tapping machine with steel-headed hammers.

f (Hz)	ΔL $= L_{n,0} - L_n$ (dB)
1/3 octave bands : ■	
50	-1,7
63	-1,4
80	2,5
100	5,5
125	7,0
160	10,6
200	12,0
250	14,0
315	15,0
400	16,8
500	20,1
630	23,0
800	26,9
1000	30,5
1250	35,5
1600	38,1
2000	40,2
2500	43,2
3150	50,0
4000	56,1
5000	55,8
octave bands : ●	
63	-0,6
125	7,2
250	13,5
500	19,2
1000	29,7
2000	40,0
4000	53,0



Rating according to ISO 717-2

$\Delta L_w (C_{i,\Delta}) = 27 \quad (-12) \quad \text{dB}$

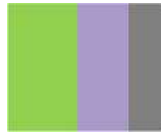
$\Delta L_{in} = 15 \quad \text{dB}$

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

No. of test report: SONL068
 Date: 27/06/2025

Name of test institute: Daidalos Peutz Laboratory of Acoustics, Hooglede, Belgium
 Signature: Gert-Jan Loobuyck

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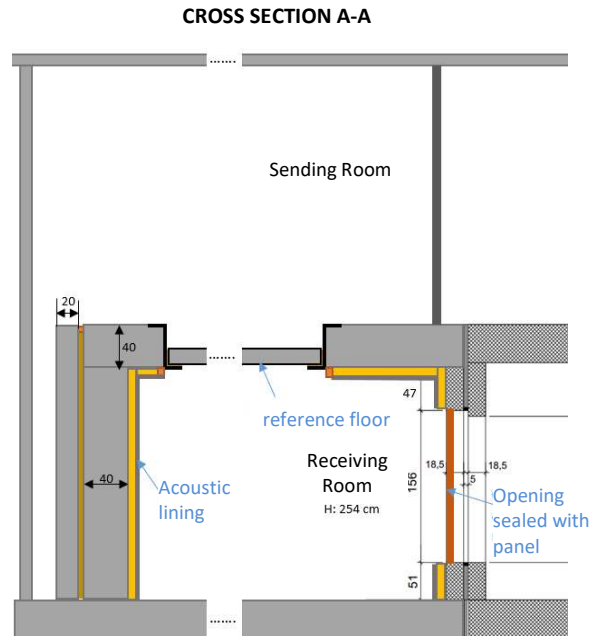
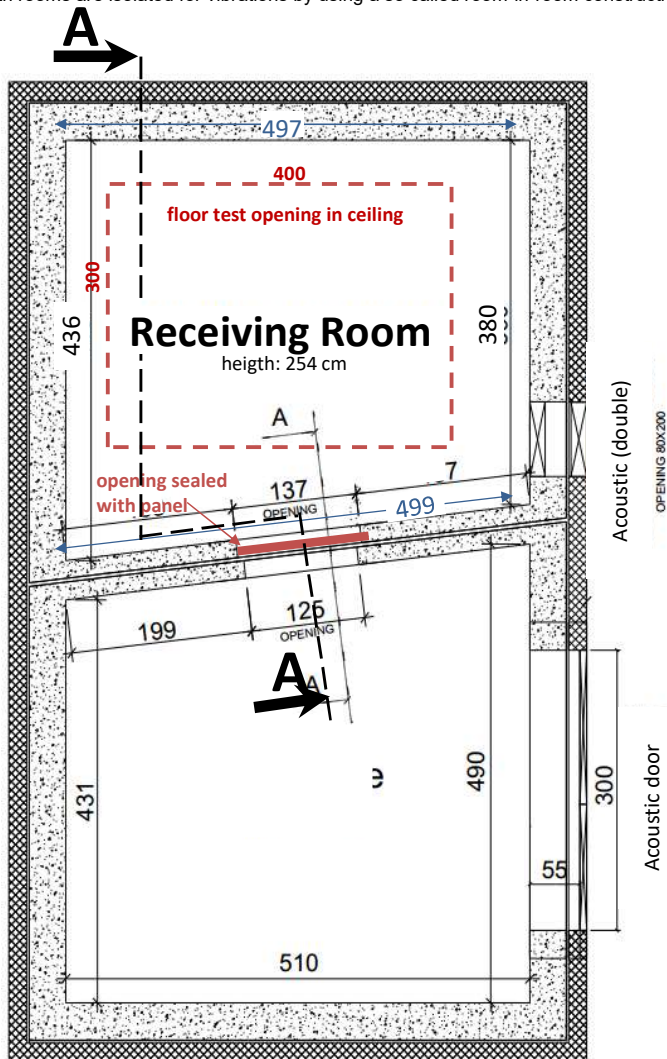
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ANNEX 1 : Sound insulation test facilities at Daidalos Peutz Laboratory of Acoustics

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/m ³)	m" (kg/m ²)	Description of the layer
1	25	1187,1*	29,7*	Fermacell 2E22 gypsum fiberboards, 25 mm: ± 29.7 kg/m ²
2a	115		10	CircoFloor system 115 mm: 4-point support (4P)
2b		13,4*		infill material: Pearls Graphite EPS, ± 13.4 kg/m ³ Renewworks
3	140	2300	322	heavyweight standard floor = solid reinforced concrete slab

Height of the Staenis floor assembly: 140 mm

* indicative measurement in the laboratory

Total height including 140 mm concrete base floor: 280 mm

CircoFloor 140 mm (4P) - Pearls Graphite EPS - Fermacell 2E22

Layer 1:

Fermacell® 2 E 22 (2 × 12.5 mm bonded gypsum fiber boards), ± 29.7 kg/m²

Adhesive was applied to the tongue-and-groove edges of the floor elements to bond the boards, following Fermacell's instructions.

The boards were then screwed together, but were not fixed to the CircoFloor system. The joints between the boards were finished with gypsum.

Layer 2a:

CircoFloor System 115 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 87 mm height-adjustable (PP) supports $\varnothing 28$ mm,

screwed in the structural panels, to achieve a total system height of 115 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: Pearls Graphite EPS Renewworks

Type: Graphite recycled EPS beads

Pearl diameter: ± 5 mm

Indicative bulk density (laboratory measurement): ± 13.4 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,

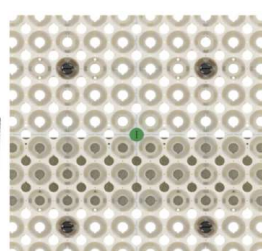
to prevent the Staenis floor assembly making rigid contact with the surrounding structure (resilient edge strip)

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

structural interlocking panel 39 cm x 39 cm



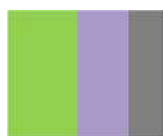
4-point support configuration



section of the CircoFloor system with Fermacell covering



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laboratory of acoustics



N° 451-TEST

NBN EN ISO 17025:2017

EA MLA signatory

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TEST REPORT Number A-2025LAB-015-L068-45835_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 their instructions and the installation guidelines, provided by Fermacell for the floor elements. Measurements were conducted 24 hours after the boards had been bonded. 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 $\pm 3.0\text{m} \times 4.0\text{m}$ and covers at least 10m^2 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



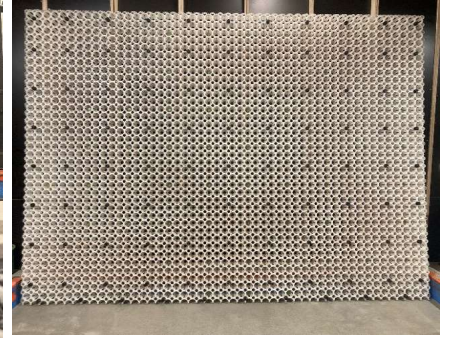
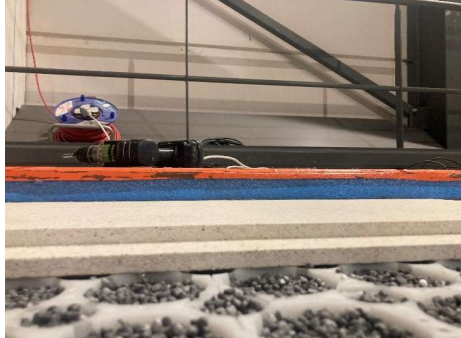
infill material: Pearls Graphite EPS Renewworks



Adhesive was applied to the tongue-and-groove edges of the floor elements



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



Measurements: four tapping machine positions on the test floor

