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NBN EN ISO 17025:2017

NOISE LAB
REPORT Number A-2020LAB-080-I694-44054_E

Customer : CENTEXBEL
 Technologiepark 70
 9052 Zwijnaarde
 Belgium

Contacts : Client : Kristina De Temmerman
 Noise lab : Els Meulemans

Tests : Laboratory measurement of the reduction of impact noise by a floating floor system
 on a heavyweight standard floor.
Product name : T2016675

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

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:	10/08/2020	2020LAB-080
Date of receipt of the specimen (s):	11/08/2020	SONI694
Date of tests:	11/08/2020	
Date of preparation of the report:	11/08/2020	

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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STANDARD METHOD

The normalised impact sound pressure level L_n 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 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 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 C_i

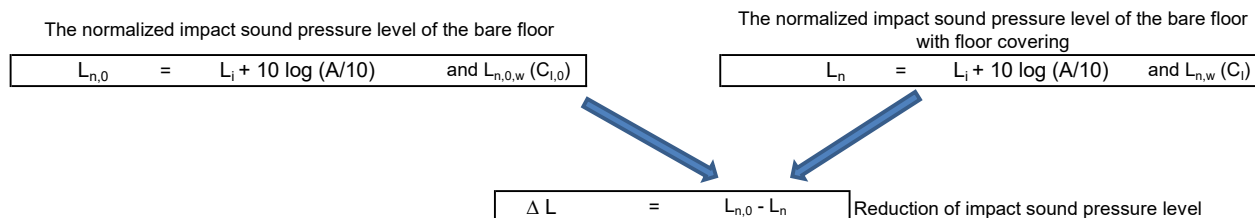
C_i = $L_{n,sum} - 15 - L_{n,w}$ With $L_{n,sum}$ the summation on an energetic basis for the one-third octave bands in the frequency range 100Hz to 2,5kHz

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

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 floorcoverings, 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

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 L_w , ΔL_w is about 3 dB.

The specific value of uncertainty is available on request

ENVIRONMENTAL CONDITIONS during the tests

	<i>Source room</i>	<i>Receiving room</i>
Temperature :	T = 24,9 °C	22,9 °C
Atmospheric pressure :	p = 1011,5 hPa	1011,5 hPa
Relative humidity :	h_r = 64,4 %	74,5 %

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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	Ln,0 bare floor	Ln 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 $L_{n,r,0} - \Delta L$	
(Hz)	(dB)	(dB)	(dB)	(dB)	(dB)	
50	44,3	42,0	2,3			
63	54,4	53,4	1,0			
80	64,3	62,5	1,8			
100	61,5	58,1	3,4	67,0	63,6	
125	61,7	57,7	4,0	67,5	63,5	
160	64,9	60,3	4,6	68,0	63,4	
200	63,3	59,2	4,1	68,5	64,4	
250	65,7	59,2	6,5	69,0	62,5	
315	66,3	58,8	7,5	69,5	62,0	
400	66,3	56,2	10,1	70,0	59,9	
500	67,0	53,0	14,0	70,5	56,5	
630	68,5	53,0	15,5	71,0	55,5	
800	68,9	49,8	19,1	71,5	52,4	
1000	69,9	47,5	22,4	72,0	49,6	
1250	69,5	41,4	28,1	72,0	43,9	
1600	69,4	36,4	33,0	72,0	39,0	
2000	68,7	32,2	36,5	72,0	35,5	
2500	68,6	26,9	41,7	72,0	30,3	
3150	66,7	19,7	47,0	72,0	25,0	
4000	64,0	13,8	50,2	/	/	
5000	60,8	9,6	51,2	/	/	
ISO 717-2	$L_{n,0,w}$	$L_{n,w}$		$L_{n,r,0,w}$	$L_{n,r,w}$	$\Delta L_w = 78 - L_{n,r,w}$
	75	53		78	57	21 dB
	$C_{l,0}$	C_l		$C_{l,r,0}$	$C_{l,r}$	$C_{l,\Delta} = C_{l,r,0} - C_{l,r}$
	-11	0		-11	0	-11 dB
						$\Delta L_{in} = \Delta L_w + C_{l,\Delta}$
						10 dB

NOISE LAB**REPORT Number A-2020LAB-080-I694-44054_E** **$L_{n,0}$** **NORMALIZED IMPACT SOUND PRESSURE LEVEL (of standard floor) in accordance with ISO 10140-3:2010**Client: **CENTEXBEL**

Date of test: 11/08/2020

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 m³Reference floor area : 12,0 m²Tested floor area : 10,1 m²

Signal : Standard tapping machine with steel-headed hammers.

reference values (according ISO 717-2)

shifted reference values (according ISO 717-2)

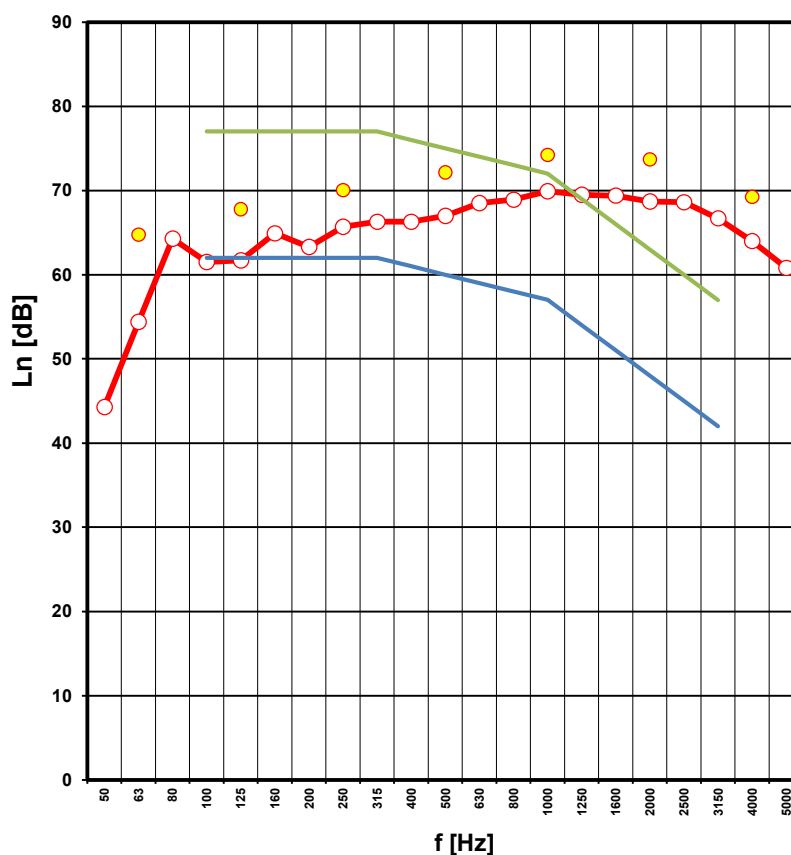
f	$L_{n,0}$	(*)
(Hz)	(dB)	
1/3 octave bands : —		
50	44,3	
63	54,4	
80	64,3	
100	61,5	
125	61,7	
160	64,9	
200	63,3	
250	65,7	
315	66,3	
400	66,3	
500	67,0	
630	68,5	
800	68,9	
1000	69,9	
1250	69,5	
1600	69,4	
2000	68,7	
2500	68,6	
3150	66,7	
4000	64,0	
5000	60,8	

octave bands : ●	
63	64,8
125	67,8
250	70,1
500	72,1
1000	74,2
2000	73,7
4000	69,2

B: $L_n \leq$ value shown

(*) b : background noise correction used

B : Maximum background noise correction used



Rating according to ISO 717-2

 $L_{n,0,w} (C_i,0) = 75 (-11) \text{ dB}$

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

No. of test report: SONI693
Date: 11/08/2020Name of test institute: Daidalos Peutz
Signature: Els Meulemans

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L_n

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

Client: CENTEXBEL

Date of test: 11/08/2020

Description of the test setup:

5,5 mm T2016675 Waterproof rigid vinyl flooring
 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 : 10,1 m²

Signal : Standard tapping machine with steel-headed hammers.

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

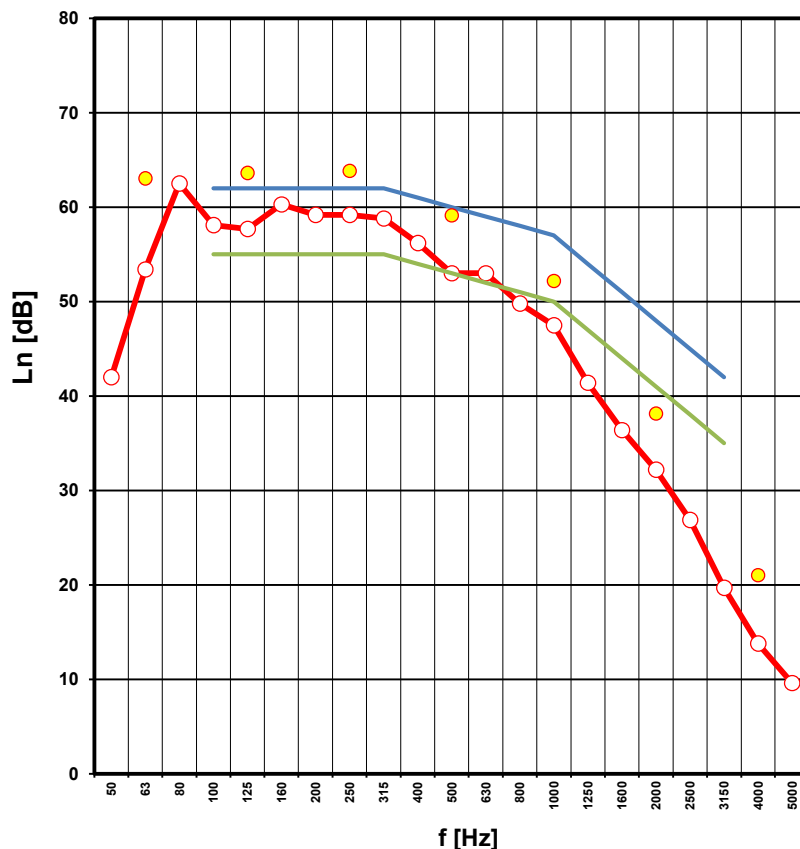
f	L _n	(*)
(Hz)	(dB)	
1/3 octave bands : —		
50	42,0	
63	53,4	
80	62,5	
100	58,1	
125	57,7	
160	60,3	
200	59,2	
250	59,2	
315	58,8	
400	56,2	
500	53,0	
630	53,0	
800	49,8	
1000	47,5	
1250	41,4	
1600	36,4	
2000	32,2	
2500	26,9	
3150	19,7	b
4000	13,8	b
5000	9,6	B

octave bands : ●	
63	63,0
125	63,6
250	63,8
500	59,1
1000	52,2
2000	38,1
4000	21,0

B: L_n < value shown

(*) b : background noise correction used

B : Maximum background noise correction used



Rating according to ISO 717-2

L_{n,w} (Ci) = 53 (0) dB

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

No. of test report: SONI694
 Date: 11/08/2020

Name of test institute: Daidalos Peutz
 Signature: Els Meulemans

NOISE LAB**REPORT Number A-2020LAB-080-I694-44054_E****REDUCTION OF IMPACT SOUND PRESSURE LEVEL BY FLOOR COVERINGS in accordance with ISO 10140-3****Client: CENTEXBEL**

Date of test: 11/08/2020

Description of the test setup:

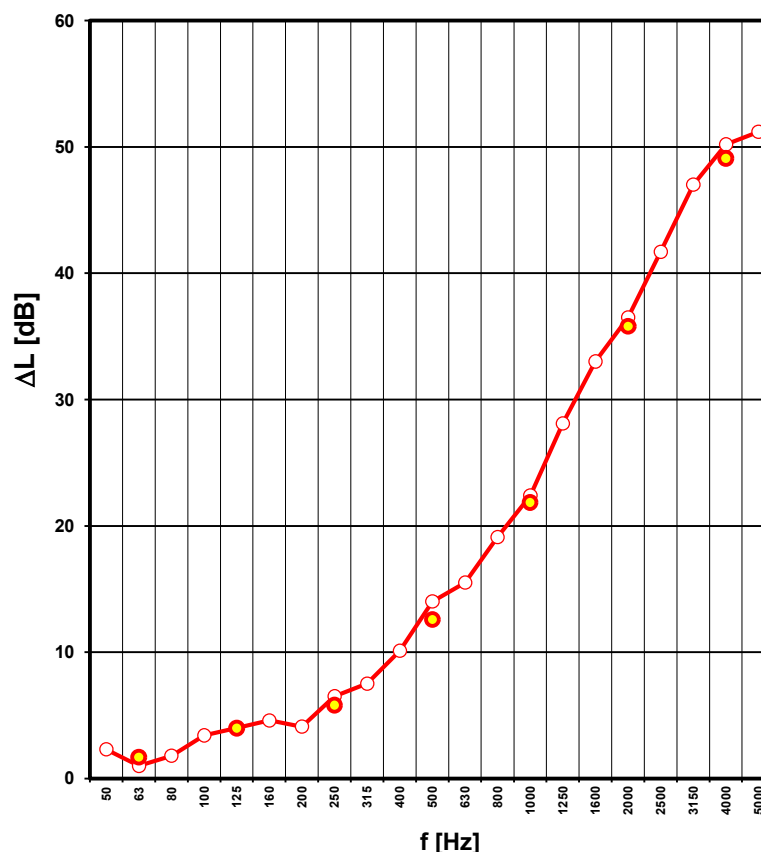
5,5 mm T2016675 Waterproof rigid vinyl flooring
 140 mm heavyweight standard floor = solid reinforced concrete slab

Receiving room volume V: 51,4 m³Reference floor area : 12,0 m²Tested floor area : 10,1 m²

Signal : Standard tapping machine with steel-headed hammers.

f (Hz)	ΔL = $L_{n,0} - L_n$ (dB)
1/3 octave bands : —	
50	2,3
63	1,0
80	1,8
100	3,4
125	4,0
160	4,6
200	4,1
250	6,5
315	7,5
400	10,1
500	14,0
630	15,5
800	19,1
1000	22,4
1250	28,1
1600	33,0
2000	36,5
2500	41,7
3150	47,0
4000	50,2
5000	51,2

octave bands : ●	
63	1,7
125	4,0
250	5,8
500	12,6
1000	21,8
2000	35,8
4000	49,1



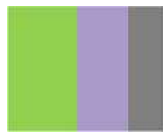
Rating according to ISO 717-2

 $\Delta L_w (C_{i,\Delta}) = 21 \quad (-11) \quad \text{dB}$ $\Delta L_{lin} = 10 \quad \text{dB}$

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

No. of test report: SONI694
 Date: 11/08/2020

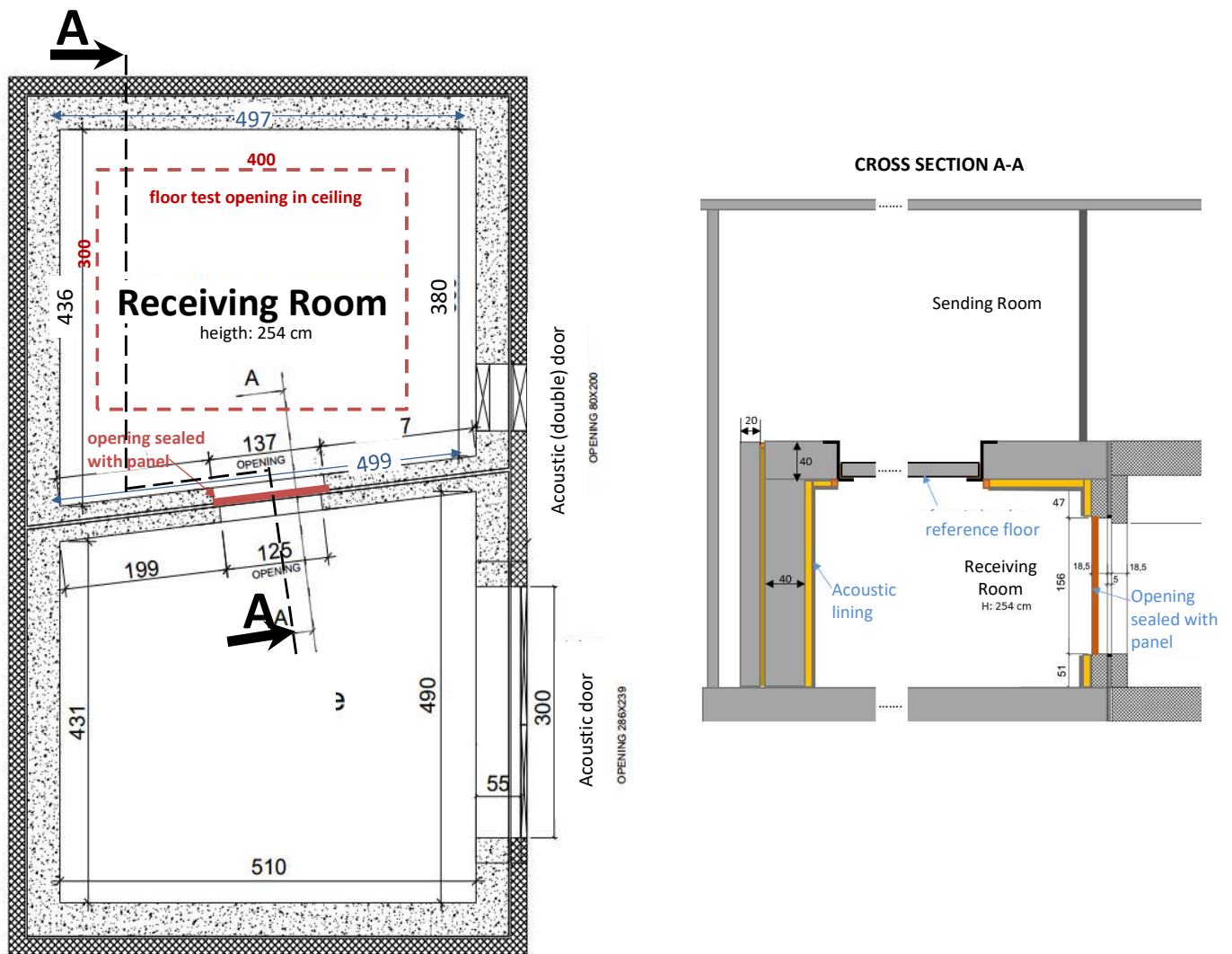
Name of test institute: Daidalos Peutz
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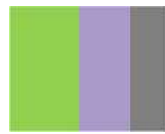


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ANNEX 1 : Sound insulation test facilities

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*

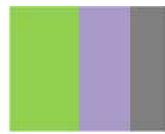
Description of the test element as a layered structure

	Thickness (mm)	ρ (kg/m ³)	m" (kg/m ²)	Description of the layer
1	5,5			T2016675 Waterproof rigid vinyl flooring
2	140	2300	322	heavyweight standard floor = solid reinforced concrete slab
3				
4				
5				
6				
7				
8				
9				
10				

T2016675 Waterproof rigid vinyl flooring

Click vinyl plank flooring
 dimensions of the planks : 123,5 x 23 x 0,55 cm

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laboratory of acoustics



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

Description of the assembly or drawing or photo

The rigid vinyl floor T2016675 was loose placed on the concrete reference floor
 The floorcovering was classified as a category II material, as mentioned in part H2.2.2 of the standard ISO 10140-1
 This category includes rigid homogeneous surface materials or complex floor covering of which at least one constituent is rigid.
 A large specimen was tested, which at least cover 10m²
 For the installation it was a click vinyl plank flooring system.



picture : Reference numbers on the packages - T2016675



picture : Rigid vinyl click planks - Front and backside



pictures : Measurement of impact sound insulation on the waterproof vinyl floor T2016675