Voxflor Industrial Park Co. Ltd
27/F, Trinity Place, No.868 Changshou Road
200060 SHANGHAI
China

Your notice of	Your reference	Date
07-09-2020		19-10-2020

Analysis Report 20.05402.01

Required tests :

ISO 354 (2003)	**Determination of the sound absorption**
ISO 10140-3 (2010)	**Determination of the reduction of transmitted impact noise**

Sample id	Information given by the client	Date of receipt
T2019221	Nylon Carpet Tile with EcoAir-Bac™	07-09-2020

Kristina De Temmerman
Order responsible

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VAT BE 0459.218.289 • IBAN BE44 2100 4729 6545 • BIC GEBABEBB

Reference: **T2019221 - Nylon Carpet Tile with EcoAir-Bac™**

Determination of the sound absorption

Standard used	ISO 354 (2003)
Performed in an external lab	Daidalos Peutz
Annex 1	report A-2020LAB-099-1-44082_E.pdf

Reference: **T2019221 - Nylon Carpet Tile with EcoAir-Bac™**

Determination of the reduction of transmitted impact noise

Standard used	ISO 10140-3 (2010)
Performed in an external lab	Daidalos Peutz
Annex 2	report A-2020LAB-099-I723-44082_E.pdf

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daidalos peutz
laboratory of acoustics

N° 451-TEST
NBN EN ISO 17025:2005

NOISE LAB
REPORT Number A-2020LAB-099-1-44082_E

Customer :	CENTEXBEL Technologiepark 70 9052 Zwijnaarde Belgium
Contacts :	**Client :** Kristina De Temmerman **Noise lab :** Els Meulemans
Tests :	Measurement of sound absorption in the reverberation room
Product name :	**T2019221 Carpet tiles**

Normative references:

NBN EN ISO 354:2003	**Acoustics - Measurement of sound absorption in a reverberation room**
NBN EN ISO 11654:1997	Acoustics - Sound absorbers for use in buildings - Rating of sound absorption
NBN ISO 9613-1:1996	Acoustics - Attenuation of sound during propagation outdoors - part 1 : Calculation of the absorption of sound by the atmosphere

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:	7/09/2020	2020LAB-099
Date of receipt of the specimen(s):	8/09/2020	1
Date of construction:	8/09/2020	
Date of tests:	8/09/2020	
Date of preparation of the report:	9/09/2020	

This test report together with its annexes contains : 10 pages and must be multiplied only in its entirety

Technical Manager,

Paul Mees

Laboratory Engineer,

Els Meulemans

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MEASURING EQUIPMENT

Signal
Brüel & Kjaer - 4292 : Omni Power Sound Source

Microphone system:
Brüel & Kjaer - 4189-L-001 : 1/2" free field microphone prepolarized, inclusive 2669L TEDS
Brüel & Kjaer - 4189 : 1/2" free field microphone, 6Hz to 20kHz, prepolarized
Brüel & Kjaer - 2669 : 1/2" microphone preamplifier
Brüel & Kjaer - 4231 : Sound calibrator 94&114dB SPL-1000Hz, Fulfils IEC 60942(2003)Class1

Number of source positions:	2	(Different sound source positions at least 3m apart.
Number of microphone positions for each source position:	8	The measurements shall be made with different microphone positions
Number of measured decays curves:	3	which are at least 1,5m apart, 2m from any sound source and 1m from
Total number of measurements with different positions for microphone & source:	16	any room surface and the test specimen.)

Signal processing
Brüel & Kjaer - 2716C : Power amplifier
Brüel & Kjaer - 3050-A-6/0: Signal generator, 6-ch. Inputmodule LAN-XI
Brüel & Kjaer - 3160-A-042: Signal generator, 4/2-ch. Input/output module LAN-XI
Brüel & Kjaer : PULSE Labshop Version 13.5
A PC with all necessary software

Reverberation room

Dimensions of the room:	Volume :	298,31 m³
	Length:	9,99 m
	Width	4,97 m
	Height	5,98 m
	Volume :	297 m³
	Total area:	278 m²

l_{max} = 12,65 m < 1,9 $V^{⅓}$

In order to improve the diffusivity, the use of diffusers is necessary
The test specimen shall have a maximum area of 15,62 m², which depends on the room volume

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TEST METHOD

The tests were conducted in accordance with the provisions of the test method EN ISO354:2003. A detailed description of the test set up has been given in the figures of annex 1 of this report.
The measurement method can be simply descibed as follows:

Essence of the test is in measuring of the reverberation time in the empty reflecting room and in the same room with the test sample inside it. The sound-absorption properties of a material depend on how the material is mounted during the test. Annex B of ISO 354:2003 specifies several different standard mountings that shall be used during a test for sound absorption. Normally a test specimen is tested using only one of the specified mountings.

From these reverberation times, the equivalent sound absorption area of the test specimen, is calculated by using Sabine's equation. Measurement is carried out in ranges of 1/3 octave and interval from 100Hz to 5000Hz.

The equivalent sound absorption area of the empty reverberation room, A1, in square metres, shall be calculated using the formula (1) :

$$A_1 = 55{,}3\ V / (c_1 T_1) - 4Vm_1 \quad [m^2] \quad (1)$$

The equivalent sound absorption area of the reverberation room containing a test specimen, A2, in square metres, shall be calculated using the formula (2) :

$$A_2 = 55{,}3\ V / (c_2 T_2) - 4Vm_2 \quad [m^2] \quad (2)$$

The equivalent sound absorption area of the test specimen, AT, in square metres, shall be calculated using the formula (3) :

$$A_T = A_2 - A_1 = 55{,}3\ V\ (1/c_2T_2 - 1/c_1T_1) - 4V(m_2 - m_1) \quad [m^2] \quad (3)$$

The sound absorption coefficient of a plane absorber or a specified array of test objects shall be calculated using the formula (4):

$$\alpha_S = A_T / S \quad (4)$$

whereas:

A1	=	*The equivalent sound absorption area of the empty reverberation room in square metres*
A2	=	*The equivalent sound absorption area of the reverberation room containing a test specimen in square metres*
V	=	volume , in cubic metres, of the empty reverberation room [m³]
c1,c2	=	the propagation speed of sound in air, in [m/s], calculated using the formula (in function of the temperature in the room during the test) c=331 + 0,6 t with t= the air temperature in degrees Celsius for temperatures in the range of 15°C to 30°C
T1	=	*the reverberation time, in seconds, of the empty reverberation room*
T2	=	*the reverberation time, in seconds, of the reverberation room after the test specimen has been introduced*
m1,m2	=	*the power attenuation coefficient, in reciprocal metres, calculated according to ISO 9613-1:1993*
AT	=	*The equivalent sound absorption area of the test specimen in square metres*
S	=	*the area, in square metres, covered by the test specimen*
αs	=	*the sound absorption coefficient*

SPECIAL MEASUREMENT CONDITIONS

-
-
-
-
-

n/a

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RATING OF SOUND ABSORPTION

α_p PRACTICAL SOUND ABSORPTION COEFFICIENT

Frequency-dependent value of the sound absorption coefficient which is based on measurements on one-third-octave bands in accordance with ISO 354 and which is calculated in octave bands in accordance with the standard ISO 11654:1997.
The practical sound absorption coefficient, api, for each octave band i, is calculated from the arithmetic mean value of the three one-third octave sound absorption coefficients within the octave. The mean value is calculated to the second decimal and rounded in steps of 0,05 and maximized to 1,00 for rounded mean values > 1,00

α_w WEIGHTED SOUND ABSORPTION COEFFICIENT

The weighted sound absorption coefficient is determined as a single number value from the practical sound absorption coefficients from 250 Hz to 4000 Hz. The practical sound absorption coefficient is calculated according to ISO 11654:1997.
Single-number frequency-independent value which equals the value of the reference curve at 500 Hz after shifting is as specified in the standard ISO 11654:1997.

SHAPE INDICATORS, L,M,H

Whenever a practical sound absorption coefficient api exceeds the value of the shifted reference curve by 0,25 or more, one or more shape indicators shall be added, in parantheses, to the aw value.
If the excess absorption occurs at 250 Hz, use the notation L.
If the excess absorption occurs at 500 Hz or 1000 Hz, use the notation M.
If the excess absorption occurs at 2000 Hz or 4000 Hz, use the notation H.

NRC NOISE REDUCTION COEFFICIENT

The NRC is a single-number index determined in a lab test and used for rating how absorptive a particular material is. This industry standard ranges from zero (perfectly reflective) to 1 (perfectly absorptive). It is simply the average of the mid-frequency sound absorption coefficients (250, 500, 1000 and 2000 Hertz) rounded to the nearest 5%.

SAA SOUND ABSORPTION AVERAGE

NRC is being replaced by the Sound Absorption Average (SAA), which is described in the current ASTM C423-09a. The SAA is a single-number rating of sound absorption properties of a material similar to NRC, except that the sound absorption values employed in the averaging are taken at the twelve one-third octave bands from 200 Hz to 2500 Hz, inclusive, and rounding is to the nearest multiple of 0.01.

The NRC and SAA results are not within the scope of the accreditation.

Test results related to tested object only. The test results should not be considered as material constants, the absorption depends not only on the material itself. The method of construction, the size of the material surface and its place in the room, affect the sound absorption characteristics of the test element.

ACCURACY

The accuracy of the absorption coefficients as calculated can be expressed in terms of repeatability of measured reverberation times (tests within one laboratory) and reproducibility (between various laboratories)

The relative standard deviation of the reverberation time T20, evaluated over a 20dB decay range, can be estimated by the following formula (see 8.2.2. van ISO 354:2003)
These relative standard deviations of the reverberation time T20 were calculated and illustrated in annex 1.

The reproducibility of absorption coefficient measurement is still under investigation

The specific value of uncertainty is available on request

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α_s SOUND ABSORPTION COEFFICIENT

EN ISO 354:2003 Acoustics - Measurement of sound absorption in a reverberation room
EN ISO 11654:1997 Acoustics - Sound absorbers for use in buildings - Rating of sound absorption

Identification number of test element: 1 **Test date:** 8/09/2020

Reverberation room: V = 298,3 m³ S_{tot} = 278,2 m²

Room conditions during measurements:

		Empty room	With testelement	
Temperature:	T =	21,0	21,0	°C
Atmospheric pressure:	p =	102,3	102,3	kPa
Relative humidity :	h_r =	73	73	%

Type of test element: **Plane absorber**

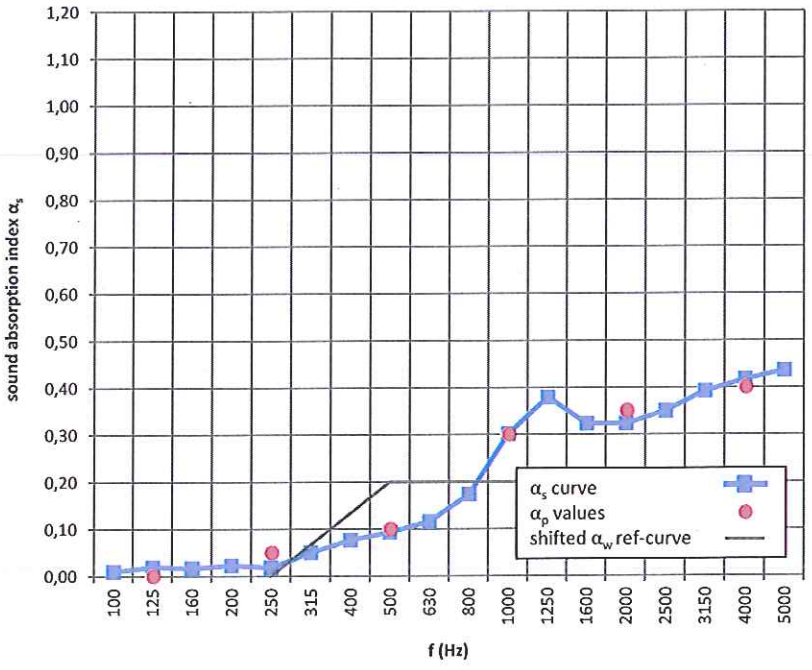
Construction characteristics:

* using plane absorber:

Area of test element:	12,02 m²
Total thickness:	6,2 mm
Number of layers,including air spaces:	1
Connection of layers:	-

f(Hz)	T1 (s)	T2 (s)	α_s
50			
63			
80			
100	11,16	10,88	0,01
125	**9,76**	**9,32**	**0,02**
160	9,83	9,44	0,02
200	10,46	9,87	0,02
250	**10,08**	**9,65**	**0,02**
315	9,95	8,85	0,05
400	9,46	8,02	0,08
500	**8,82**	**7,32**	**0,09**
630	9,51	7,45	0,12
800	9,43	6,70	0,17
1000	**9,04**	**5,37**	**0,30**
1250	8,48	4,70	0,38
1600	7,50	4,67	0,32
2000	**6,68**	**4,34**	**0,32**
2500	5,82	3,86	0,35
3150	5,02	3,36	0,39
4000	**4,08**	**2,86**	**0,42**
5000	3,36	2,46	0,44

f(Hz)	α_p
125	0,00
250	0,05
500	0,10
1000	0,30
2000	0,35
4000	0,40



α_w = 0,20 (H) *
acoustical absorption class: E

NRC =	0,2 **
SAA =	0,19 **

* It is strongly recommended to use this single-number rating in combination with the complete sound absorption coefficient curve
** These results are not within the scope of the accreditation

Requested by: CENTEXBEL,Technologiepark 70,9052 Zwijnaarde
TESTELEMENT: (product name, for details see Annex 2)

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NOISE LAB
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ANNEX 1 : PRECISION

The relative standard deviation of the reverberation time T20

f	T_1 (s)	ε_{20} (s)	T_2 (s)	ε_{20} (s)
50	0	0	0	0
63	0	0	0	0
80	0	0	0	0
100	11,16	0,54	10,88	0,54
125	9,76	0,45	9,32	0,44
160	9,83	0,40	9,44	0,40
200	10,46	0,37	9,87	0,36
250	10,08	0,33	9,65	0,32
315	9,95	0,29	8,85	0,27
400	9,46	0,25	8,02	0,23
500	8,82	0,22	7,32	0,20
630	9,51	0,20	7,45	0,18
800	9,43	0,18	6,70	0,15
1000	9,04	0,15	5,37	0,12
1250	8,48	0,13	4,70	0,10
1600	7,50	0,11	4,67	0,09
2000	6,68	0,09	4,34	0,08
2500	5,82	0,08	3,86	0,06
3150	5,02	0,06	3,36	0,05
4000	4,08	0,05	2,86	0,04
5000	3,36	0,04	2,46	0,04

ε_{20} = The relative standard deviation of the reverberation time T20, evaluated over a 20dB decay range, can be estimated by the following formula (see 8.2.2. van ISO 354:2003)

$$\varepsilon_{20}(T) = T\sqrt{\frac{2{,}42 + {}^{3{,}59}/_{N}}{f\,T}}$$

T_1 (s) = reverberation time of the empty room
T_2 (s) = reverberation time of the reverberation room after with the test specimen
f (Hz) = centre frequency of the one-third-octave band
N = number of decay curves evaluated

The relative standard deviation of the sound absorption coefficient

f	αs	ε_α	$\delta_{95}(\alpha)$
50	0,00	0,00	0,00
63	0,00	0,00	0,00
80	0,00	0,00	0,00
100	0,01	0,03	0,01
125	0,02	0,03	0,01
160	0,02	0,02	0,01
200	0,02	0,02	0,01
250	0,02	0,02	0,01
315	0,05	0,02	0,01
400	0,08	0,02	0,01
500	0,09	0,02	0,01
630	0,12	0,02	0,01
800	0,17	0,02	0,01
1000	0,30	0,02	0,01
1250	0,38	0,02	0,01
1600	0,32	0,02	0,01
2000	0,32	0,02	0,01
2500	0,35	0,02	0,01
3150	0,39	0,02	0,01
4000	0,42	0,02	0,01
5000	0,44	0,03	0,01

$\varepsilon(\alpha)$ = The relative standard deviation of the sound absorption coefficient

$$\varepsilon(\alpha) = \frac{55{,}3\,V}{c\,S}\sqrt{\left(\frac{\varepsilon_{20}(T_2)}{T_2^2}\right)^2 + \left(\frac{\varepsilon_{20}(T_1)}{T_1^2}\right)^2}$$

$\delta_{95}(\alpha)$ = 95% confidence interval

$$\delta_{95}(\alpha) = \frac{1{,}96\,\varepsilon(\alpha)}{\sqrt{N}}$$

T_1 (s) = reverberation time of the empty room
T_2 (s) = reverberation time of the reverberation room after with the test specimen
V = Volume of the reverberation room
c = the propagation speed of sound in air

S = number of decay curves evaluated
N = the area, in square metres, covered by the test specimen

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NOISE LAB
REPORT Number A-2020LAB-099-1-44082_E

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

T2019221 Carpet tiles

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ANNEX 3: Technical datasheet

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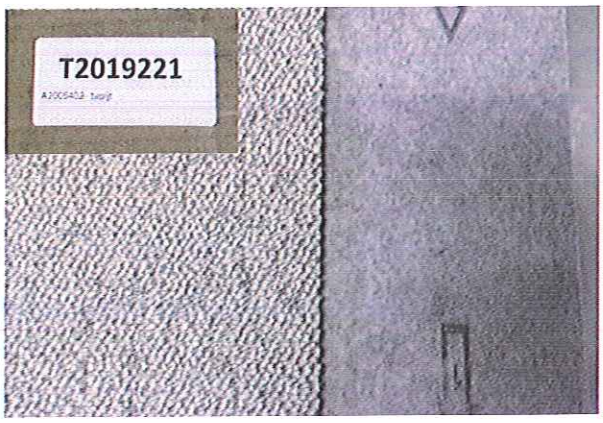
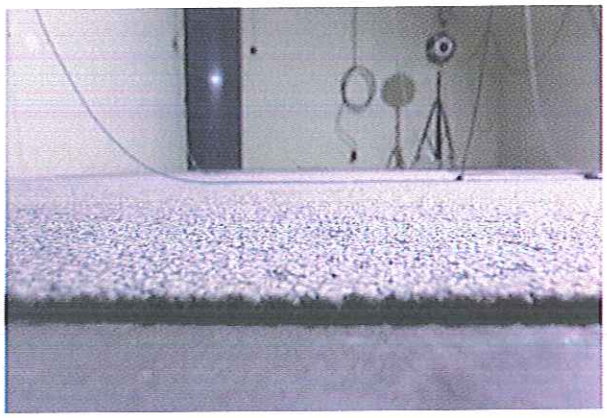
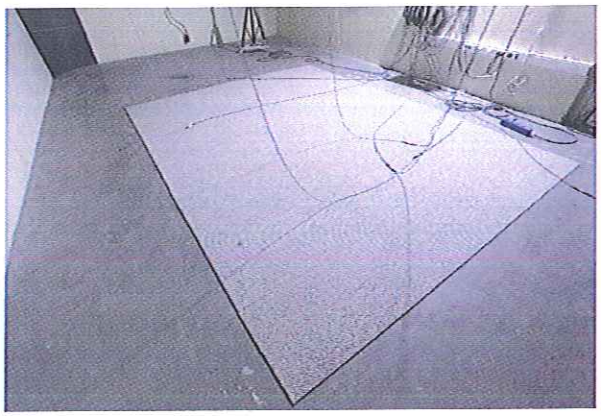
ANNEX 4: photographs of the test element or the test arrangement

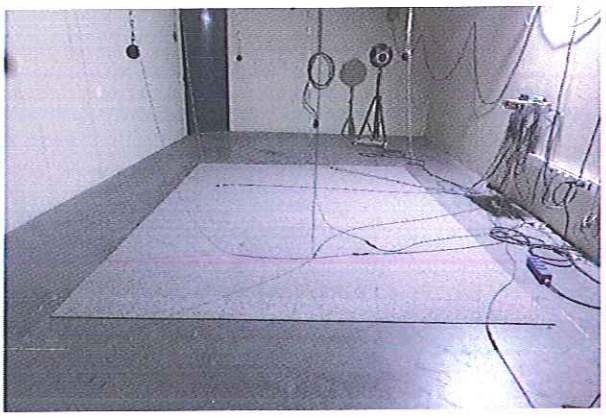
Description of the assembly or drawing or photo

The carpet tiles were loosely laid on the concrete floor of the reverberation room









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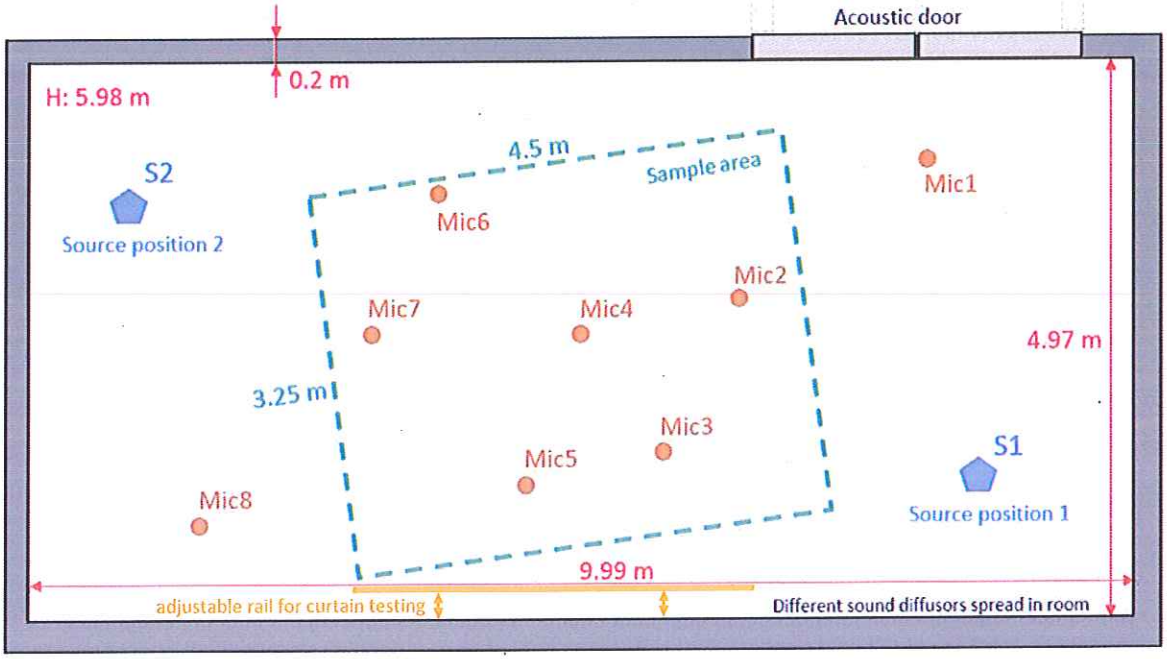
ANNEX 5: Sketch of the test room

The test room was built and finished according ISO 354.

Reverberation Room (according EN ISO 354)



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N° 451-TEST
NBN EN ISO 17025:2017

NOISE LAB
REPORT Number A-2020LAB-099-I723-44082_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 : **T2019221 carpet tiles**

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:	7/09/2020	2020LAB-099
Date of receipt of the specimen (s):	8/09/2020	SONI723
Date of tests:	8/09/2020	
Date of preparation of the report:	9/09/2020	

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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NOISE LAB
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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 & Kjaer - 3923 : rotating microphone boom

One rotating microphone system in the receiving room

Number of tapping machine positions:	3
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:	48 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:	144 s
Number of reverberation time measurements (with graphic control):	27

Test chambers

Volume receiving room:	51,4 m³
Reference floor area:	12,00 m²
Surface test floor :	1,50 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 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

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

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_{En}

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 $C_{I,\Delta} = C_{I,r,0} - C_{I,r} = -11 - C_{I,r}$

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

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SPECIAL MEASUREMENT CONDITIONS

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 =	20,7 °C	21,0 °C
Atmospheric pressure :	p =	1022,5 hPa	1022,5 hPa
Relative humidity :	h_r =	67,4 %	67,0 %

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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	44,2	41,4	2,8			
63	56,1	54,0	2,1			
80	61,4	61,0	0,4			
100	60,0	57,6	2,4	67,0	64,6	
125	63,3	58,2	5,1	67,5	62,4	
160	64,0	59,6	4,4	68,0	63,6	
200	65,0	55,3	9,7	68,5	58,8	
250	66,4	54,3	12,1	69,0	56,9	
315	66,1	50,8	15,3	69,5	54,2	
400	65,6	47,1	18,5	70,0	51,5	
500	67,0	42,9	24,1	70,5	46,4	
630	68,1	38,9	29,2	71,0	41,8	
800	69,1	33,0	36,1	71,5	35,4	
1000	69,6	27,1	42,5	72,0	29,5	
1250	69,4	22,3	47,1	72,0	24,9	
1600	69,5	17,3	52,2	72,0	19,8	
2000	69,6	12,4	57,2	72,0	14,8	
2500	69,4	10,2	59,2	72,0	12,8	
3150	67,8	6,1	61,7	72,0	10,3	
4000	64,9	5,0	59,9	/	/	
5000	61,5	5,6	55,9	/	/	
ISO 717-2	$L_{n,0,w}$	$L_{n,w}$		$L_{n,r,0,w}$	$L_{n,r,w}$	$\Delta L_w = 78 - Ln,r,w$
	75	49		78	53	25 dB
	$C_{I,0}$	C_I		$C_{I,r,0}$	$C_{I,r}$	$C_{I,\Delta} = CI,r,0 - CI,r$
	-10	1		-11	1	-12 dB

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

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

Client: CENTEXBEL

Date of test: 7/09/2020

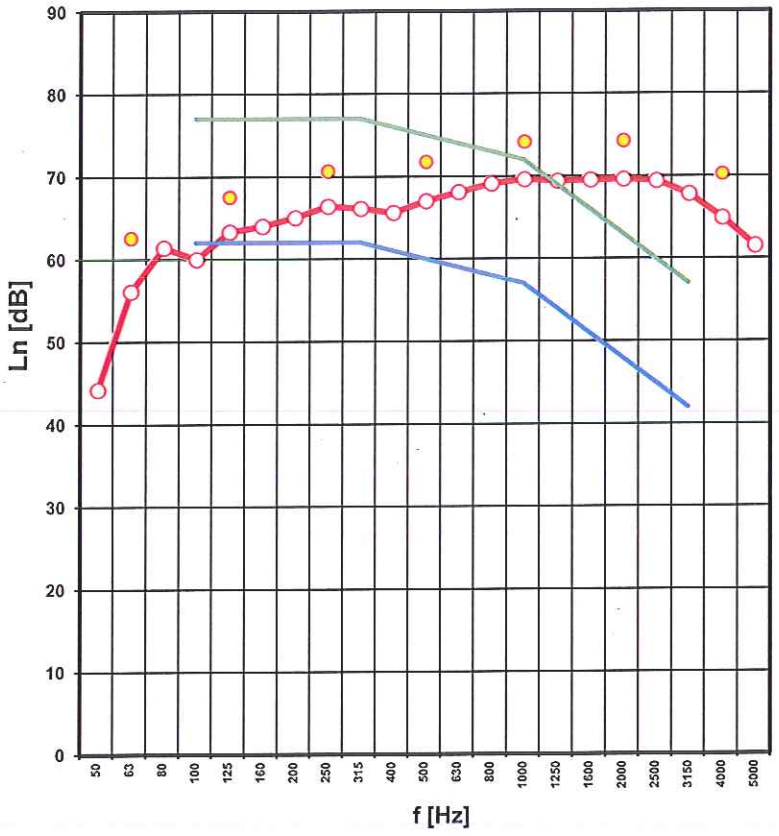
Description of the test setup:
The base floor used is a 140 mm thick solid reinforced concrete slab.
According to ISO 10140-5 Annex C this is the "heavyweight standard floor".

Receiving room volume V: 51,4 m³
Reference floor area : 12,0 m²
Tested floor area : 1,5 m²
Signal : Standard tapping machine with steel-headed hammers.

f (Hz)	$L_{n,0}$ (dB)	(*)
1/3 octave bands :		
50	44,2	
63	56,1	
80	61,4	
100	60,0	
125	63,3	
160	64,0	
200	65,0	
250	66,4	
315	66,1	
400	65,6	
500	67,0	
630	68,1	
800	69,1	
1000	69,6	
1250	69,4	
1600	69,5	
2000	69,6	
2500	69,4	
3150	67,8	
4000	64,9	
5000	61,5	

octave bands :	
63	62,6
125	67,5
250	70,6
500	71,8
1000	74,1
2000	74,3
4000	70,2

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) = 75 (-10) dB

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

No.of test report: SONI721
Date: 7/09/2020

Name of test institute: Daidalos Peutz
Signature: Els Meulemans

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NOISE LAB
REPORT Number A-2020LAB-099-I723-44082_E

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

Client: CENTEXBEL Date of test: 8/09/2020

Description of the test setup:

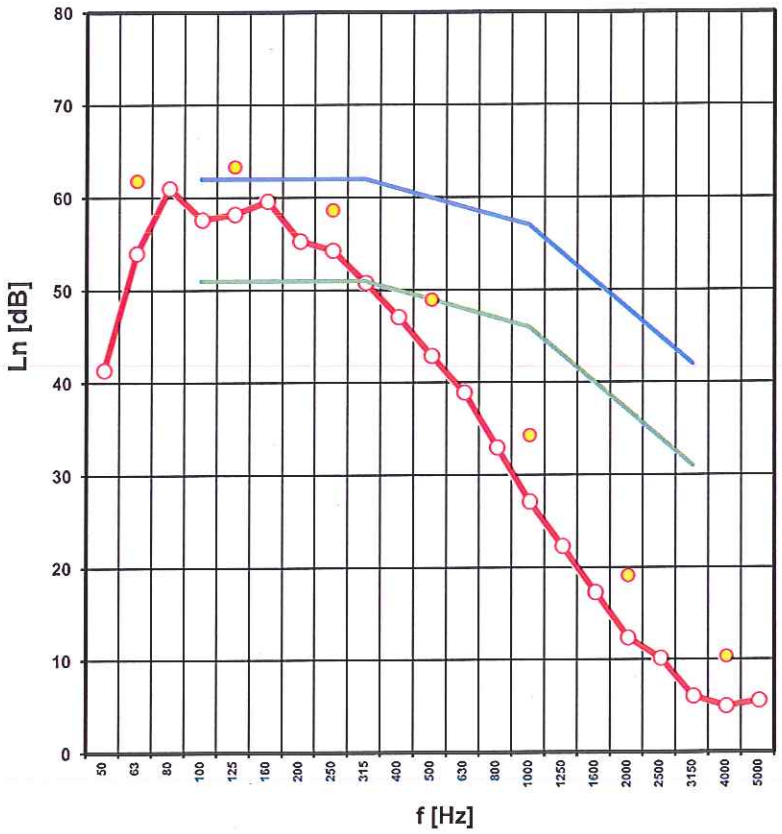
6,2 mm T2019221 carpet tiles
140 mm heavyweight standard floor = solid reinforced concrete slab

Receiving room volume V: 51,4 m³
Reference floor area : 12,0 m²
Tested floor area : 1,5 m²
Signal : Standard tapping machine with steel-headed hammers.

f (Hz)	L_n (dB)	(*)
1/3 octave bands :		
50	41,4	
63	**54,0**	
80	61,0	
100	57,6	
125	**58,2**	
160	59,6	
200	55,3	
250	**54,3**	
315	50,8	
400	47,1	
500	**42,9**	
630	38,9	
800	33,0	
1000	**27,1**	
1250	22,3	
1600	17,3	
2000	**12,4**	b
2500	10,2	b
3150	6,1	B
4000	**5,0**	B
5000	5,6	B

octave bands :	
63	**61,8**
125	**63,3**
250	**58,6**
500	**49,0**
1000	**34,3**
2000	**19,1**
4000	**10,4**

B: Ln=< value shown



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

Rating according to ISO 717-2

Ln,w (Ci) = 49 (1) dB

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

No.of test report: SONI723 Name of test institute: Daidalos Peutz
Date: 8/09/2020 Signature: Els Meulemans

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

Client: CENTEXBEL Date of test: 8/09/2020

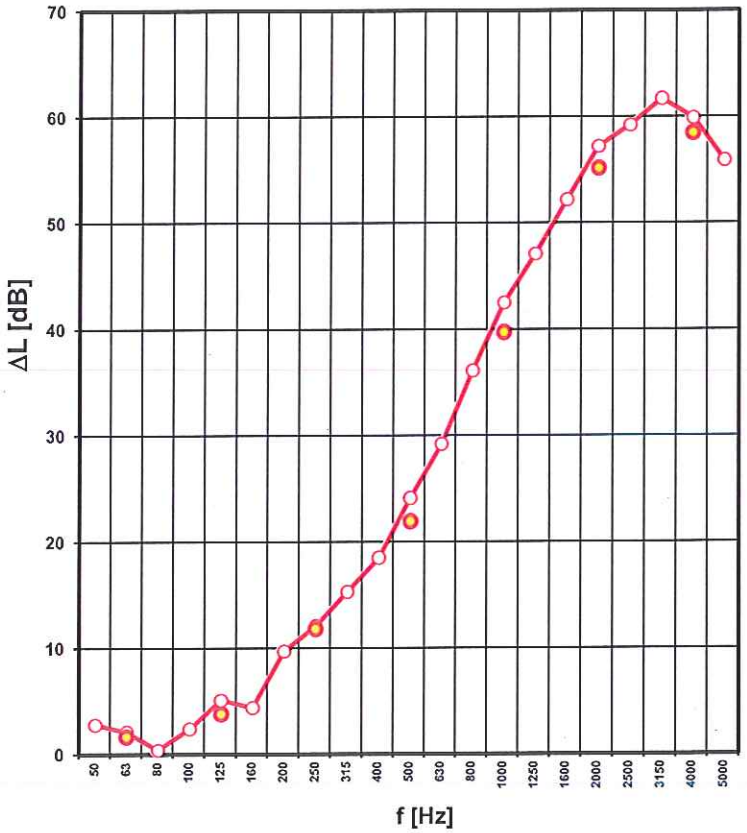
Description of the test setup:

6,2 mm T2019221 carpet tiles
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 : 1,5 m²
Signal : Standard tapping machine with steel-headed hammers.

f (Hz)	ΔL $=L_{n,0}- L_n$ (dB)
1/3 octave bands :	
50	2,8
63	**2,1**
80	0,4
100	2,4
125	**5,1**
160	4,4
200	9,7
250	**12,1**
315	15,3
400	18,5
500	**24,1**
630	29,2
800	36,1
1000	**42,5**
1250	47,1
1600	52,2
2000	**57,2**
2500	59,2
3150	61,7
4000	**59,9**
5000	55,9

octave bands :	
63	**1,6**
125	**3,8**
250	**11,8**
500	**21,9**
1000	**39,7**
2000	**55,2**
4000	**58,5**



Rating according to ISO 717-2

$\Delta L_w (C_{i,\Delta})$ = 25 (-12) dB

ΔL_{fin} = 13 dB

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

No.of test report: SONI723 Name of test institute: Daidalos Peutz
Date: 8/09/2020 Signature: Els Meulemans

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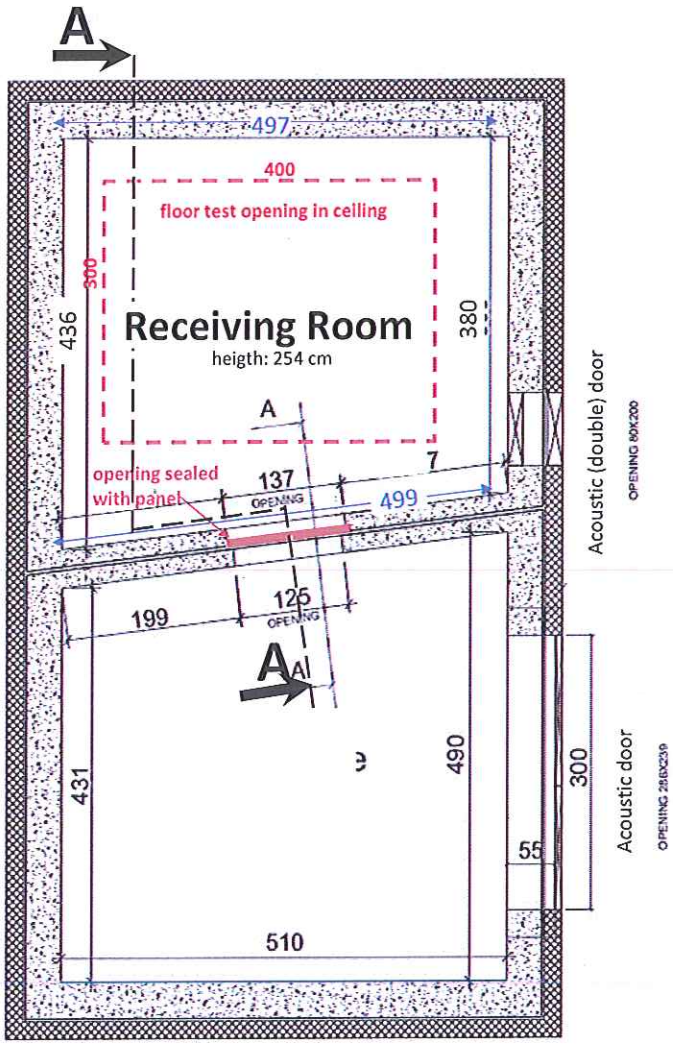
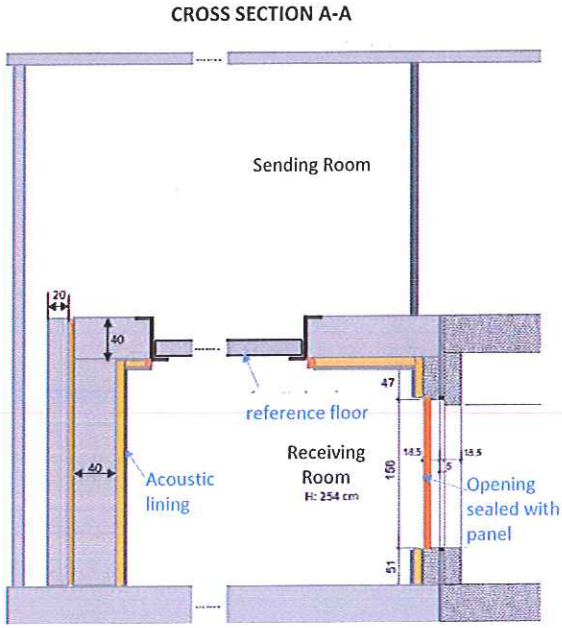
ANNEX 1 : Sound insulation test facilities

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	6,2			T2019221 carpet tiles
2	140	2300	322	heavyweight standard floor = solid reinforced concrete slab
3				
4				
5				
6				
7				
8				
9				
10				

Total thickness = 146 mm

Carpet tiles with reference number T2019221

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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

2 carpet samples (2 x 0,25m²) were placed loosely on 3 positions onto the reference floor.
indicative thickness of the carpet tiles : 6,2 mm