Daidalos Peutz bouwfysisch ingenieursbureau
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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-2022LAB-106-5-45049_E

Customer :	Texdecor Rue d'Hem, 2 59780 Willems France	
Contacts :	**Client :**	Max Olivier Loubert
	Noise lab :	Els Meulemans
Tests :	Measurement of sound absorption in the reverberation room	
Product name :	**SlimBox wall (1060 x 1060 x 42 mm) - air cavity 30 mm - type E70 mounting**	

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
ISO 12999-2:2020	Acoustics - Determination and application of measurement uncertainties in building acoustics Part 2: Sound absorption

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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:	8/10/2022	2022LAB-106
Date of receipt of the specimen(s):	3/05/2023	5
Date of construction:	3/05/2023	
Date of tests:	3/05/2023	
Date of preparation of the test report:	25/09/2023	

The measurements were carried out at Daidalos Peutz Laboratory for Acoustics at Hooglede, see appendix 1
This test report together with its annexes contains : 9 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:	Total volume :	298,3 m³
	Length:	9,99 m
	Width	4,97 m
	Height	5,98 m
	Volume door opening :	1,32 m³
	Total area:	279,9 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) :

$A_1 = 55{,}3\ V / (c_1 T_1) - 4Vm_1$ [m²] (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) :

$A_2 = 55{,}3\ V / (c_2 T_2) - 4Vm_2$ [m²] (2)

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

$A_T = A_2 - A_1 = 55{,}3\ V\ (1/c_2T_2 - 1/c_1T_1) - 4V(m_2 - m_1)$ [m²] (3)

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

$\alpha_S = A_T / S$ (4)

whereas:
- A_1 = *The equivalent sound absorption area of the empty reverberation room in square metres*
- A_2 = *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]
- c_1, c_2 = 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
- T_1 = *the reverberation time, in seconds, of the empty reverberation room*
- T_2 = *the reverberation time, in seconds, of the reverberation room after the test specimen has been introduced*
- m_1, m_2 = *the power attenuation coefficient, in reciprocal metres, calculated according to ISO 9613-1:1993*
- A_T = *The equivalent sound absorption area of the test specimen in square metres*
- S = *the area, in square metres, covered by the test specimen*
- α_s = *the sound absorption coefficient*

SPECIAL MEASUREMENT CONDITIONS

-
-
-
-
-

n/a
The edge frame weighed +/- 15 kg/m² instead of 20 kg/m² as proposed in the standard ISO 354

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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 C423-17. 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 expanded uncertainty under reproducibility conditions, U, is calculated in accordance to the standard ISO 12999-2 for the confidence level of 95%, used the coverage factor k=2

$U = u*k$ met

u = uncertainty under reproducibility conditions
k = coverage factor (k=2 for a confidence level of 95%)
U = expanded uncertainty under reproducibility conditions

This standard specifies how to calculate :
- the uncertainty of sound absoption coefficients and equivalent sound absorption areas measured according to ISO 354
- the uncertainty of the practical and weighted sound absorption coefficients determined according to ISO 11654

The numbers given are derived form inter-laboratory measurements with different types of test specimens including suspended ceilings, mineral wool, foams.

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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
ISO 12999-2:2020	Acoustics - Determination and application of measurement uncertainties in building acoustics - Part 2: sound absorption

Identification number of test element: **5** **Test date:** 3/05/2023
Name of test institute : Daidalos Peutz Laboratory of Acoustics, Hooglede, Belgium

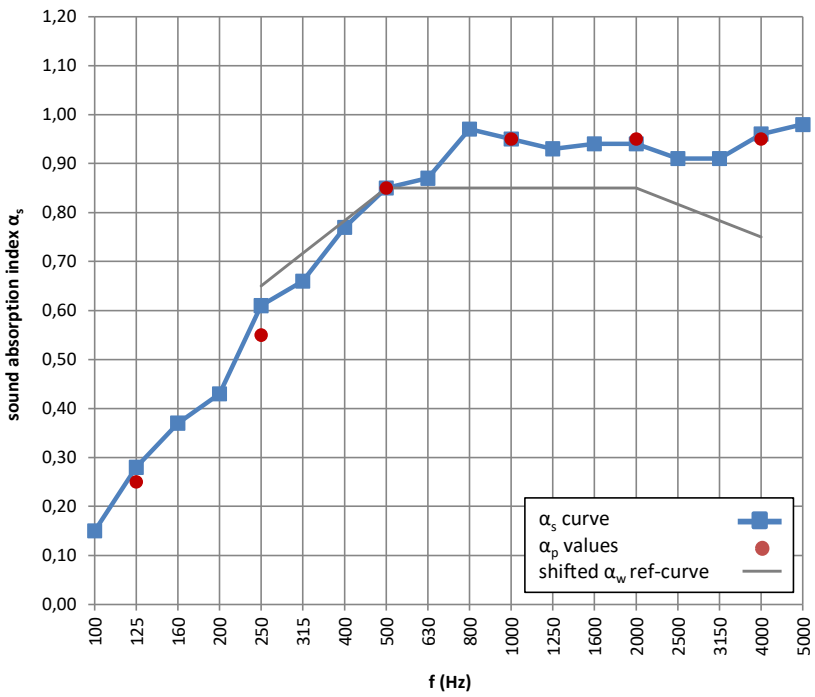
Reverberation room: V = 298,3 m³ S_{tot} = 279,9 m²

Room conditions during measurements:		Empty room	With testelement	
Temperature:	T =	18,4	18,4	°C
Atmospheric pressure:	p =	102,4	102,3	kPa
Relative humidity :	h_r =	58	55	%

Type of test element: **Plane absorber**
Construction characteristics: Mounting type in line with ISO354 Annex B: Type E mounting (with an airspace)
Area of test element: 10,11 m²
Total thickness: 72 mm
Number of layers,including air spaces: 2
Connection of layers: The panels 'SlimBox wall' were placed loosely on wooden supports, with a height of 30 mm, on the floor of the reverberation room, one against the other.

f(Hz)	T_1 (s)	T_2 (s)	α_s	±U (k=2)
50				
63				
80				
100	9,97	7,59	0,15	± 0,10
125	**8,48**	**5,67**	**0,28**	± 0,13
160	8,36	5,07	0,37	± 0,13
200	8,97	4,98	0,43	± 0,12
250	**9,41**	**4,26**	**0,61**	± 0,14
315	9,52	4,10	0,66	± 0,13
400	8,79	3,63	0,77	± 0,12
500	**8,75**	**3,40**	**0,85**	± 0,12
630	8,90	3,39	0,87	± 0,11
800	8,62	3,13	0,97	± 0,11
1000	**8,75**	**3,19**	**0,95**	± 0,11
1250	8,30	3,16	0,93	± 0,10
1600	7,31	2,98	0,94	± 0,10
2000	**6,46**	**2,82**	**0,94**	± 0,10
2500	5,45	2,65	0,91	± 0,08
3150	4,44	2,37	0,91	± 0,08
4000	**3,50**	**2,02**	**0,96**	± 0,09
5000	2,75	1,72	0,98	± 0,08

f(Hz)	α_p	±U (k=2)
125	0,25	
250	0,55	± 0,10
500	0,85	± 0,08
1000	0,95	± 0,08
2000	0,95	± 0,08
4000	0,95	± 0,10



α_w = 0,85 * ± 0,07 (k=2)
Sound absorption class: B

NRC = 0,85 **
SAA = 0,82 **

* 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: Texdecor,Rue d'Hem, 2,59780 Willems
TESTELEMENT: (product name, for details see Annex 2)

SlimBox wall (1060 x 1060 x 42 mm) - air cavity 30 mm - type E70 mounting

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NOISE LAB
TEST REPORT Number A-2022LAB-106-5-45049_E

ANNEX 1: 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

Texdecor - SlimBox wall
manufacturer: Texdecor
Type : acoustic wall panels
application : wall panels
composition: Slimbox wall panels are made of PET. (lining and acoustic fleece) 60% coming from recycled plastic bottles

The SlimBox wall panels are produced frameless in Slimpanel 9 mm (recycled polyester fiber felt) and filled with acoustic fleece.
On the wall, the SlimBox wall panels are mounted on rail brackets, offset 30 mm form the wall, and improved acoustic performance thanks to the plenum.

The islands used in this test:
With a total thickness of 42 mm, the 9 mm PET surface is combined with an acoustic fleece (+/- 533 g/m², thickness +/- 22,5 mm)
dimensions : 1060 x 1060 x 42 mm

photo : Interior of the SlimBox wall panel (1060 x 1060 x 42 mm) with wooden supports of 30 mm high

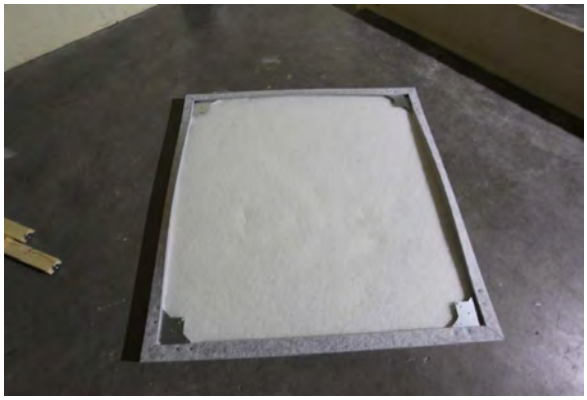

photo : Interior of the SlimBox wall panel (1060 x 1060 x 42 mm) with the PE fleece (+/- 533 g/m², thickness +/- 22,5 mm)

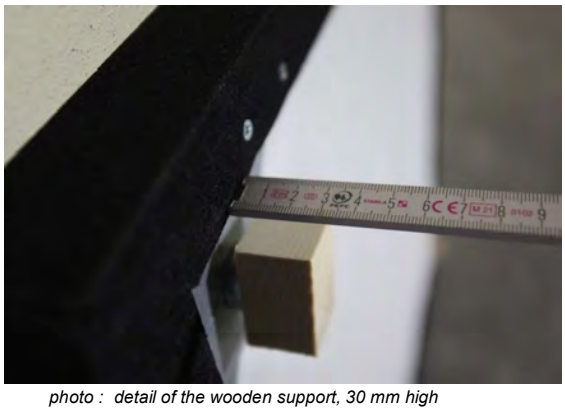

photo : detail of the wooden support, 30 mm high

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NOISE LAB
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ANNEX 2: 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

Further information can be obtained directly from the manufacturer.

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ANNEX 3: photographs of the test element or the test arrangement

Description of the assembly or drawing or photo

The SlimBox wall panels were mounted with an airspace behind them, in accordance with ISO 354 type E-70 mounting.
The edges were not parallel to the nearest edge of the reverberation room.
The SlimBox wall panels were placed loosely on wooden supports, with a height of 30 mm, on the floor of the reverberation room
The SlimBox wall panels were placed loosely on the wooden supports, one against the other.
A wooden plywood frame, with a thickness of 18mm, encloses the air space behind the sample.
The joints between the wooden frame and the surface of the room were sealed with adhesive tape to prevent air leakage between the enclosure space and the outside.
The wooden frame covers the perimeter of the edges of the test sample.
The joinst between the frame and the test sample were sealed with adhesive tape.
The total construction height was 72 mm, the distance between the exposed face of the test specimen and the surface of the room.

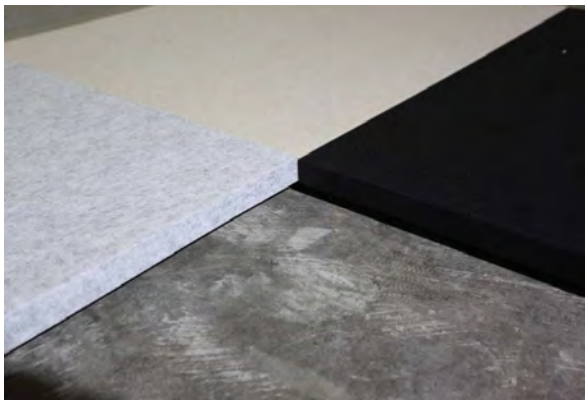

photo : construction details, placement of the panels on wooden supports, side by side

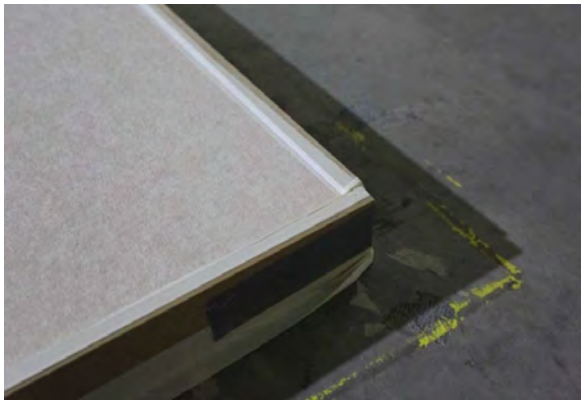

photo : detail of the wooden frame around the test set-up

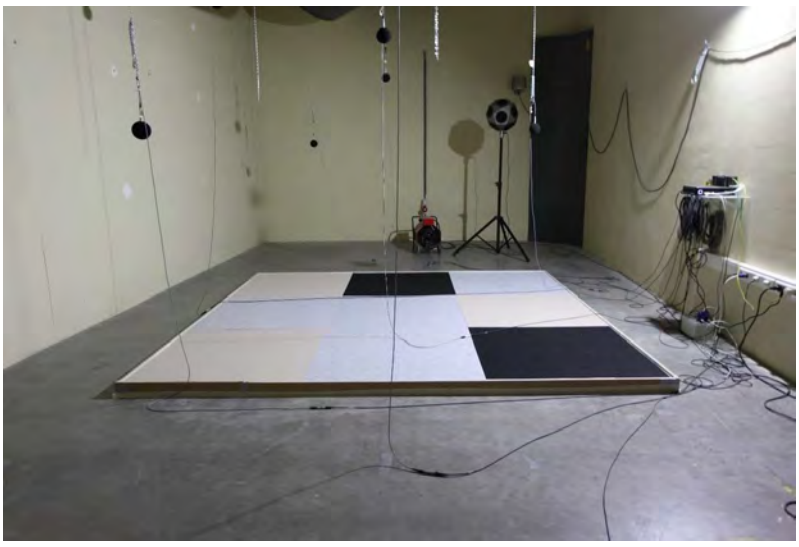

photo : total measurement setup

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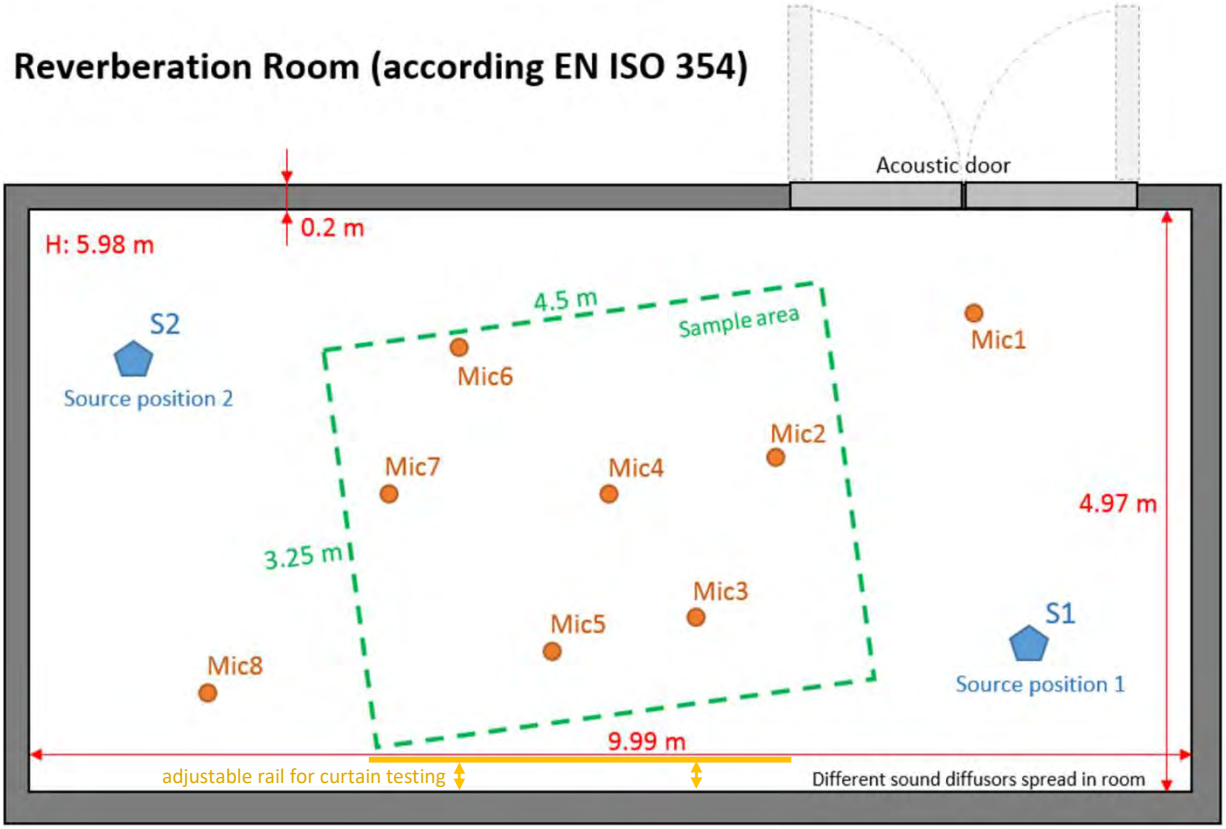
ANNEX 4: Sketch of the test room

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

The test room was built and finished according ISO 354.



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NOISE LAB
TEST REPORT Number A-2022LAB-106-4-45049_E

Customer :	Texdecor Rue d'Hem, 2 59780 Willems France	
Contacts :	**Client :**	Max Olivier Loubert
	Noise lab :	Els Meulemans
Tests :	Measurement of sound absorption in the reverberation room	
Product name :	**SlimBox wall (1060 x 1060 x 42 mm) - air cavity 30 mm**	

Normative references:

NBN EN ISO 354:2003	**Acoustics - Measurement of sound absorption in a reverberation room**
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NBN ISO 9613-1:1996	Acoustics - Attenuation of sound during propagation outdoors - part 1 : Calculation of the absorption of sound by the atmosphere
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Paul Mees

Laboratory Engineer,

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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.)

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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:	Total volume :	298,3 m³
	Length:	9,99 m
	Width	4,97 m
	Height	5,98 m
	Volume door opening :	1,32 m³
	Total area:	279,9 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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$$A_1 = 55{,}3\ V / (c_1 T_1) - 4Vm_1 \quad [m^2] \quad (1)$$

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):

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

NOTE *For discrete objects A_{obj} is used instead of α_s*
For a specific array of objects the result is given as α_s

The equivalent sound absorption area of discrete absorbers or individual objects shall be calculated using the formula (5):

$$A_{obj} = A_T / n \quad (5)$$

where n is the number of tested objects

whereas:

A_1	=	*The equivalent sound absorption area of the empty reverberation room in square metres*
A_2	=	*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]*
c_1, c_2	=	*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
T_1	=	*the reverberation time, in seconds, of the empty reverberation room*
T_2	=	*the reverberation time, in seconds, of the reverberation room after the test specimen has been introduced*
m_1, m_2	=	*the power attenuation coefficient, in reciprocal metres, calculated according to ISO 9613-1:1993*
A_T	=	*The equivalent sound absorption area of the test specimen in square metres*
S	=	*the area, in square metres, covered by the test specimen*
α_s	=	*the sound absorption coefficient*
A_{obj}	=	*the equivalent sound absorption area per object*
n	=	*the number of tested discrete or individual objects*

SPECIAL MEASUREMENT CONDITIONS

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n/a

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RATING OF SOUND ABSORPTION

A_{obj} EQUIVALENT SOUND ABSORPTION AREA PER OBJECT

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 equivalent sound absorption area for each octave band i, is calculated from the arithmetic mean value of the three one-third octave sound absorption coefficients within the octave. In line with the standard ISO 354, the mean value is calculated to the first decimal.

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.

But an individual object is NOT evaluated with the standard ISO 11654, both in terms of the single-number value and the absorption class.

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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A_{obj} EQUIVALENT SOUND ABSORPTION AREA PER OBJECT

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
Acoustics - Determination and application of measurement uncertainties in building acoustics - Part 2: sound absorption

Identification number of test element: 4 **Test date:** 3/05/2023
Name of test institute : Daidalos Peutz Laboratory of Acoustics, Hooglede, Belgium

Reverberation room:	V =	298,3 m³	S_{tot} =	279,9 m²	
Room conditions during measurements:		Empty room	With testelement		
Temperature:	T =	18,4	17,9	°C	
Atmospheric pressure:	p =	102,4	102,3	kPa	
Relative humidity :	h_r =	58	57	%	

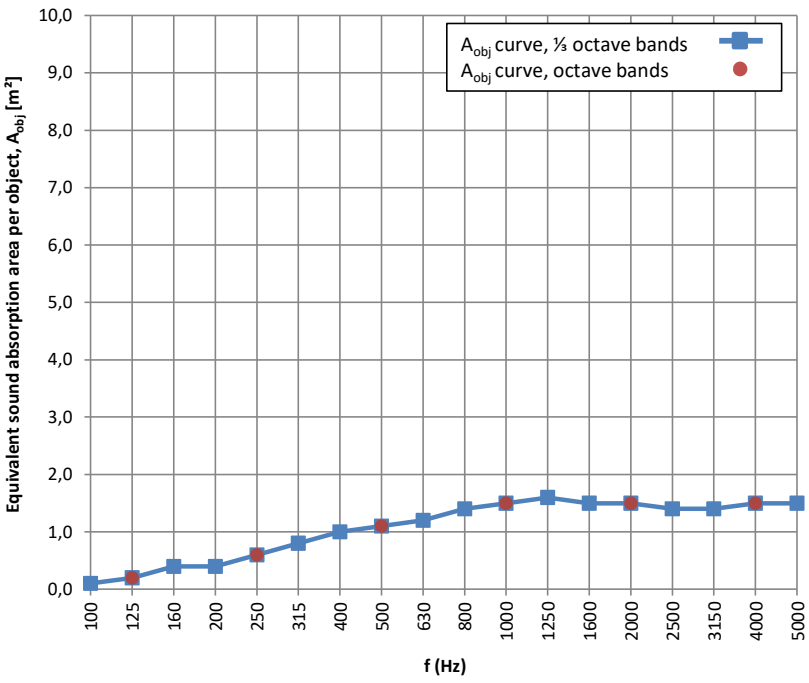
Type of test element: **Discrete object**
Construction characteristics:

Number of tested objects 4
Number of location setups in the reverberation room 1

Test setup: The Slimbox mur placed loosely on wooden supports, with a height of 30 mm

f(Hz)	T_1 (s)	T_2 (s)	A_{obj} [m²]
50			
63			
80			
100	9,97	9,01	0,1
125	**8,48**	**7,42**	**0,2**
160	8,36	6,63	0,4
200	8,97	6,81	0,4
250	**9,41**	**6,50**	**0,6**
315	9,52	5,86	0,8
400	8,79	5,13	1,0
500	**8,75**	**4,82**	**1,1**
630	8,90	4,69	1,2
800	8,62	4,34	1,4
1000	**8,75**	**4,26**	**1,5**
1250	8,30	4,01	1,6
1600	7,31	3,78	1,5
2000	**6,46**	**3,53**	**1,5**
2500	5,45	3,29	1,4
3150	4,44	2,89	1,4
4000	**3,50**	**2,40**	**1,5**
5000	2,75	2,00	1,5

f(Hz)	A_{obj} [m²]
125	0,2
250	0,6
500	1,1
1000	1,5
2000	1,5
4000	1,5



Note: an individual object is not evaluated according to ISO 11654 (α_w and class)

Requested by: Texdecor,Rue d'Hem, 2,59780 Willems
TESTELEMENT: (product name, for details see Annex 2)

SlimBox wall (1060 x 1060 x 42 mm) - air cavity 30 mm

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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				
63				
80				
100	9,97	0,51	9,01	0,49
125	8,48	0,42	7,42	0,4
160	8,36	0,37	6,63	0,33
200	8,97	0,34	6,81	0,3
250	9,41	0,32	6,50	0,26
315	9,52	0,28	5,86	0,22
400	8,79	0,24	5,13	0,18
500	8,75	0,22	4,82	0,16
630	8,90	0,19	4,69	0,14
800	8,62	0,17	4,34	0,12
1000	8,75	0,15	4,26	0,11
1250	8,30	0,13	4,01	0,09
1600	7,31	0,11	3,78	0,08
2000	6,46	0,09	3,53	0,07
2500	5,45	0,08	3,29	0,06
3150	4,44	0,06	2,89	0,05
4000	3,50	0,05	2,40	0,04
5000	2,75	0,04	2,00	0,03

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	A_{obj} (m²)	ε_{Aobj}	δ_{95} (A_{obj})
50			
63			
80			
100	0,1	0,1	0,0
125	0,2	0,1	0,1
160	0,4	0,1	0,1
200	0,4	0,1	0,0
250	0,6	0,1	0,0
315	0,8	0,1	0,0
400	1,0	0,1	0,0
500	1,1	0,1	0,0
630	1,2	0,1	0,0
800	1,4	0,1	0,0
1000	1,5	0,1	0,0
1250	1,6	0,1	0,0
1600	1,5	0,1	0,0
2000	1,5	0,1	0,0
2500	1,4	0,1	0,0
3150	1,4	0,1	0,0
4000	1,5	0,1	0,0
5000	1,5	0,1	0,1

$\varepsilon(A_{obj})$ = The relative standard deviation of the sound absorption coefficient

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

δ_{95} (A_{obj}) = 95% confidence interval

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

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

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

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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

Texdecor - SlimBox wall
manufacturer: Texdecor
Type : acoustic wall panels
application : wall panels
composition: Slimbox wall panels are made of PET. (lining and acoustic fleece) 60% coming from recycled plastic bottles

The SlimBox wall panels are produced frameless in Slimpanel 9 mm (recycled polyester fiber felt) and filled with acoustic fleece.
On the wall, the SlimBox wall panels are mounted on rail brackets, offset 30 mm form the wall, and improved acoustic performance thanks to the plenum.

The panels used in this test:
With a total thickness of 42 mm, the 9 mm PET surface is combined with an acoustic fleece (+/- 533 g/m², thickness +/- 22,5 mm)
dimensions : 1060 x 1060 x 42 mm

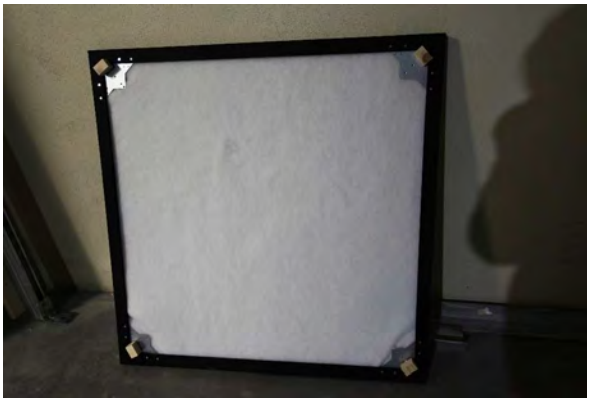

photo : back face of the SlimBox wall panel, filled with acoustic fleece

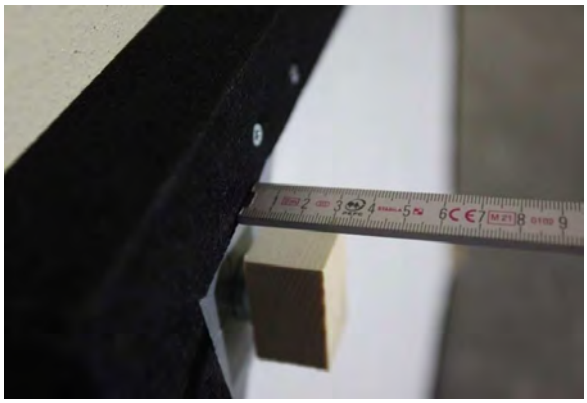

photo : side view of the test object: SlimBox wall panel on wooden supports, with a heigth of 30 mm

photographs : back of the ceiling island, filled with acoustic fleece

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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

Further information can be obtained directly from the manufacturer.

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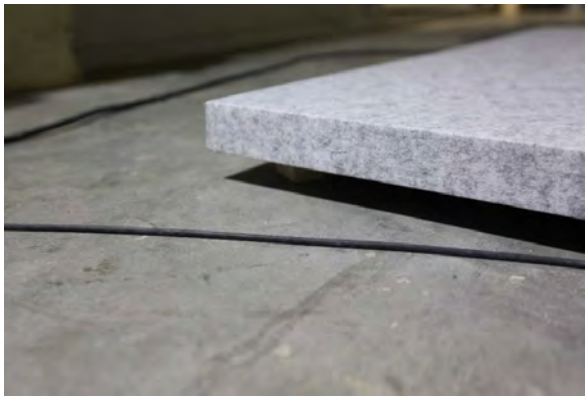
ANNEX 4: photographs of the test element or the test arrangement

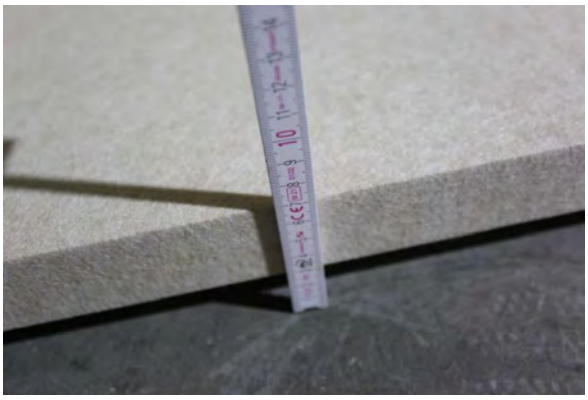
Description of the assembly or drawing or photo

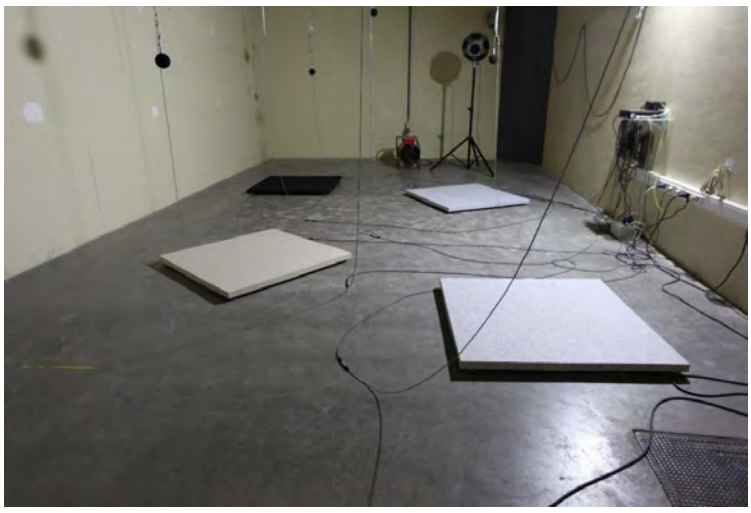
4 SlimBox wall panels supported on wooden supports, with a heigth of 30 mm, were placed in the reverberation room.
The 4 objects were arranged randomly, spaced at least 1 m apart and 1 m away to any other boundary.
The test specimen comprise a sufficient number of individual objects (4 wall panels) to provide a measurable change in the equivalent sound absorption area of the room, AT

one object = 1 SlimBox wall island with the dimensions of 1060 x 1060 x 42 mm

Photographs of the test set-up







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ANNEX 5: Sketch of the test room

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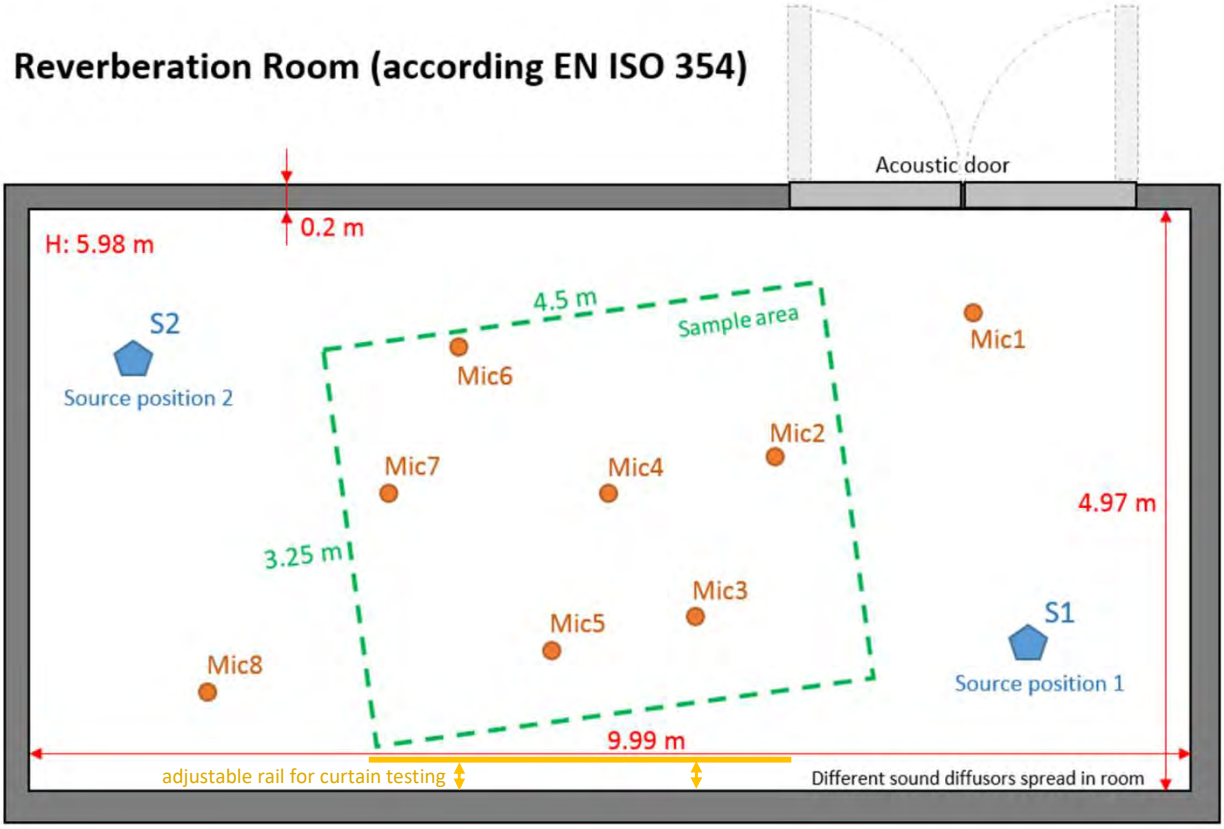
The test room was built and finished according ISO 354.



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TEST REPORT Number A-2022LAB-106-2-45049_E

Customer :	Texdecor Rue d'Hem, 2 59780 Willems France	
Contacts :	**Client :**	Max Olivier Loubert
	Noise lab :	Els Meulemans
Tests :	Measurement of sound absorption in the reverberation room	
Product name :	**SlimBox island ceiling (1060 x 1060 x 42 mm) - air cavity 270 mm - type E310 mounting**	

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
ISO 12999-2:2020	Acoustics - Determination and application of measurement uncertainties in building acoustics Part 2: Sound absorption

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:	8/10/2022	2022LAB-106
Date of receipt of the specimen(s):	3/05/2023	2
Date of construction:	3/05/2023	
Date of tests:	3/05/2023	
Date of preparation of the test report:	25/09/2023	

The measurements were carried out at Daidalos Peutz Laboratory for Acoustics at Hooglede, see appendix 1
This test report together with its annexes contains : 9 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:	Total volume :	298,3 m³
	Length:	9,99 m
	Width	4,97 m
	Height	5,98 m
	Volume door opening :	1,32 m³
	Total area:	279,9 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) :

$A_1 = 55{,}3\ V / (c_1 T_1) - 4Vm_1$ [m²] (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) :

$A_2 = 55{,}3\ V / (c_2 T_2) - 4Vm_2$ [m²] (2)

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

$A_T = A_2 - A_1 = 55{,}3\ V\ (1/c_2T_2 - 1/c_1T_1) - 4V(m_2 - m_1)$ [m²] (3)

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

$\alpha_S = A_T / S$ (4)

whereas:
- A_1 = *The equivalent sound absorption area of the empty reverberation room in square metres*
- A_2 = *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]
- c_1, c_2 = 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
- T_1 = *the reverberation time, in seconds, of the empty reverberation room*
- T_2 = *the reverberation time, in seconds, of the reverberation room after the test specimen has been introduced*
- m_1, m_2 = *the power attenuation coefficient, in reciprocal metres, calculated according to ISO 9613-1:1993*
- A_T = *The equivalent sound absorption area of the test specimen in square metres*
- S = *the area, in square metres, covered by the test specimen*
- α_s = *the sound absorption coefficient*

SPECIAL MEASUREMENT CONDITIONS

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n/a
The edge frame weighed +/- 15 kg/m² instead of 20 kg/m² as proposed in the standard ISO 354

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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 C423-17. 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 expanded uncertainty under reproducibility conditions, U, is calculated in accordance to the standard ISO 12999-2 for the confidence level of 95%, used the coverage factor k=2

$U = u*k$ met

u = uncertainty under reproducibility conditions
k = coverage factor (k=2 for a confidence level of 95%)
U = expanded uncertainty under reproducibility conditions

This standard specifies how to calculate :
- the uncertainty of sound absoption coefficients and equivalent sound absorption areas measured according to ISO 354
- the uncertainty of the practical and weighted sound absorption coefficients determined according to ISO 11654

The numbers given are derived form inter-laboratory measurements with different types of test specimens including suspended ceilings, mineral wool, foams.

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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
ISO 12999-2:2020	Acoustics - Determination and application of measurement uncertainties in building acoustics - Part 2: sound absorption

Identification number of test element: **2** **Test date:** 3/05/2023
Name of test institute : Daidalos Peutz Laboratory of Acoustics, Hooglede, Belgium

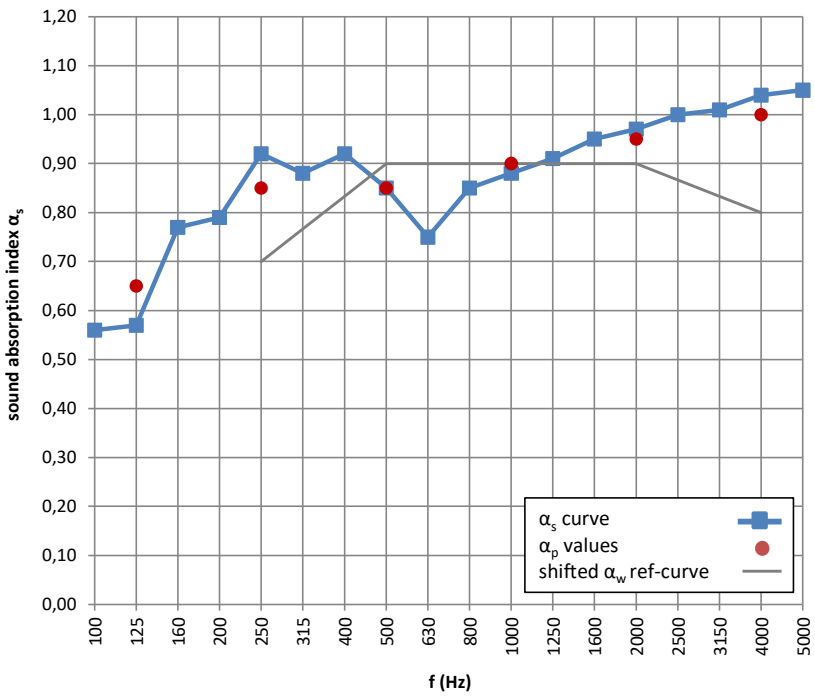
Reverberation room: V = 298,3 m³ S_{tot} = 279,9 m²

Room conditions during measurements:		Empty room	With testelement	
Temperature:	T =	18,4	16,7	°C
Atmospheric pressure:	p =	102,4	102,4	kPa
Relative humidity :	h_r =	58	60	%

Type of test element: **Plane absorber**
Construction characteristics:
Mounting type in line with ISO354 Annex B: Type E mounting (with an airspace)
Area of test element: 10,11 m²
Total thickness: 312 mm
Number of layers,including air spaces: 2
Connection of layers: The SlimBox islands were placed loosely on wooden supports, with a height of 270mm, on the floor of the reverberation room, one against the other.

f(Hz)	T_1 (s)	T_2 (s)	α_s	±U (k=2)
50				
63				
80				
100	9,97	4,60	0,56	± 0,30
125	**8,48**	**4,21**	**0,57**	± 0,24
160	8,36	3,56	0,77	± 0,25
200	8,97	3,62	0,79	± 0,20
250	**9,41**	**3,35**	**0,92**	± 0,20
315	9,52	3,47	0,88	± 0,16
400	8,79	3,26	0,92	± 0,14
500	**8,75**	**3,43**	**0,85**	± 0,12
630	8,90	3,72	0,75	± 0,10
800	8,62	3,42	0,85	± 0,10
1000	**8,75**	**3,35**	**0,88**	± 0,10
1250	8,30	3,23	0,91	± 0,10
1600	7,31	2,98	0,95	± 0,10
2000	**6,46**	**2,79**	**0,97**	± 0,10
2500	5,45	2,54	1,00	± 0,09
3150	4,44	2,27	1,01	± 0,09
4000	**3,50**	**1,97**	**1,04**	± 0,09
5000	2,75	1,69	1,05	± 0,08

f(Hz)	α_p	±U (k=2)
125	0,65	
250	0,85	± 0,13
500	0,85	± 0,08
1000	0,90	± 0,08
2000	0,95	± 0,08
4000	1,00	± 0,10



α_w = 0,90 * ± 0,07 (k=2)
Sound absorption class: A

NRC = 0,9 **
SAA = 0,89 **

* 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: Texdecor,Rue d'Hem, 2,59780 Willems
TESTELEMENT: (product name, for details see Annex 2)

SlimBox island ceiling (1060 x 1060 x 42 mm) - air cavity 270 mm - type E310 mounting

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ANNEX 1: 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

Texdecor - SlimBox island ceiling
manufacturer: Texdecor
Type : acoustic island ceiling
application : ceiling
composition: Slimbox ceiling islands are made of PET. (lining and acoustic fleece) 60% coming from recycled plastic bottles

The SlimBox ceiling islands are produced frameless in Slimpanel 9 mm (recycled polyester fiber felt) and filled with acoustic fleece.
When installed on ceilings, they are suspended by 4 adjustable cables, allowing you to play with heights and create a rhythm.

The islands used in this test:
With a total thickness of 42 mm, the 9 mm PET surface is combined with an acoustic fleece (+/- 533 g/m², thickness +/- 22,5 mm)
dimensions : 1060 x 1060 x 42 mm

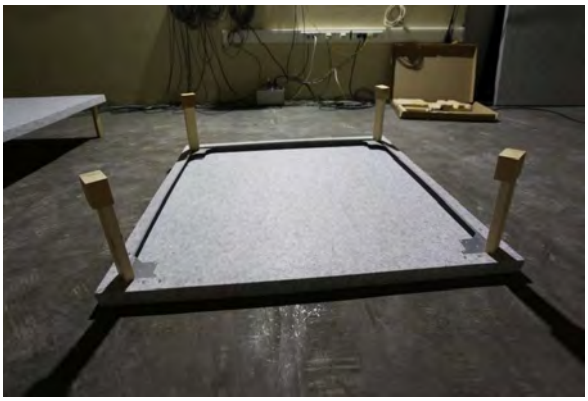

photo : Interior of the SlimBox ceiling island (1060 x 1060 x 42 mm) without the PE fleece, with 270 mm high wooden supports

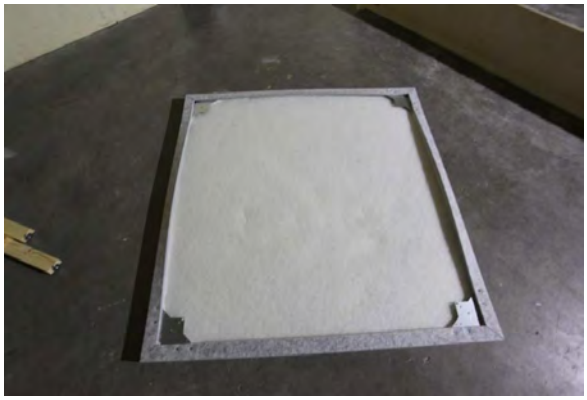

photo : Interior of the SlimBox ceiling island (1060 x 1060 x 42 mm) with the PE fleece (+/- 533 g/m², thickness +/- 22,5 mm)

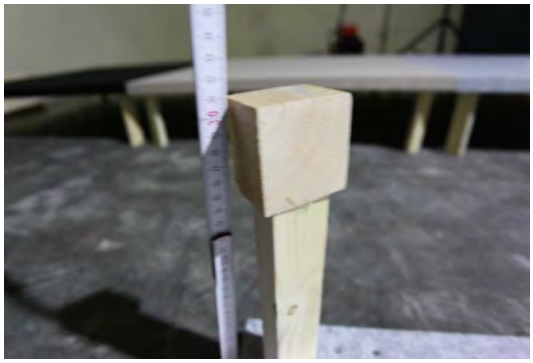

photo : detail of the wooden support

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ANNEX 2: 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

Further information can be obtained directly from the supplier.

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ANNEX 3: photographs of the test element or the test arrangement

Description of the assembly or drawing or photo

The SlimBox islands were mounted with an airspace behind them, in accordance with ISO 354 type E-310 mounting.
The edges were not parallel to the nearest edge of the reverberation room.
The SlimBox islands were placed loosely on wooden supports, with a height of 270mm, on the floor of the reverberation room
The SlimBox islands were placed loosely on the wooden supports, one against the other.
A wooden plywood frame, with a thickness of 18mm, encloses the air space behind the sample.
The joints between the wooden frame and the surface of the room were sealed with adhesive tape to prevent air leakage between the enclosure space and the outsi
The wooden frame covers the perimeter of the edges of the test sample.
The joinst between the frame and the test sample were sealed with adhesive tape.
The total construction height was 312 mm, the distance between the exposed face of the test specimen and the surface of the room.

photo : construction details, island placement on wooden feets, side by side

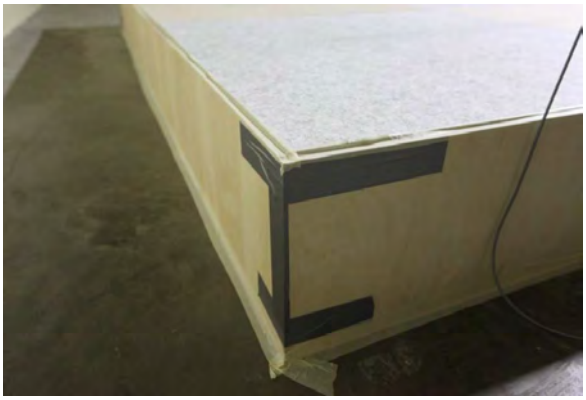

photo : detail of the wooden frame around the test set-up

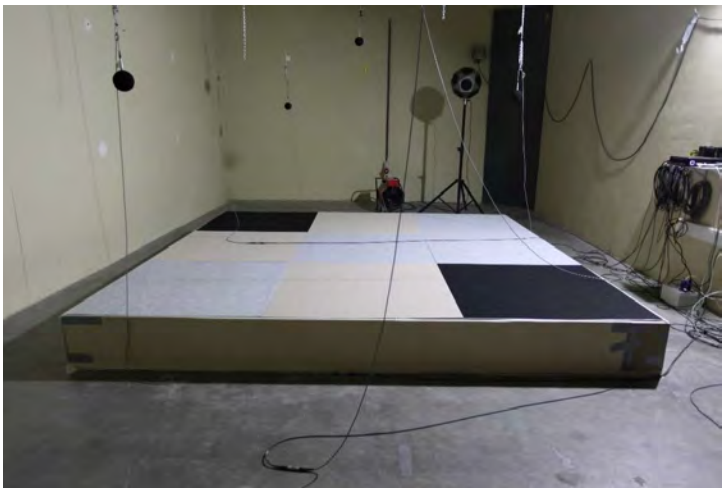

photo : total measurement setup

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ANNEX 4: Sketch of the test room

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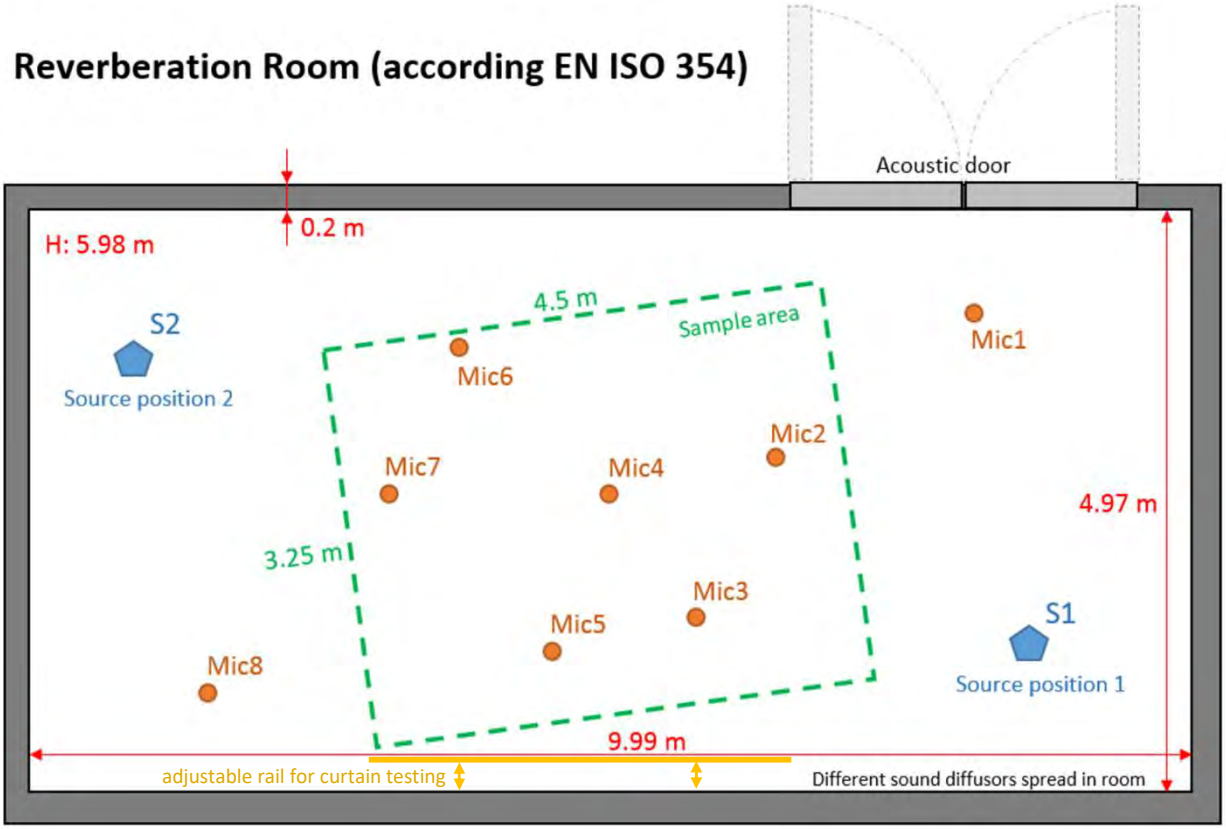
The test room was built and finished according ISO 354.



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NOISE LAB
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Customer :	Texdecor Rue d'Hem, 2 59780 Willems France	
Contacts :	**Client :**	Max Olivier Loubert
	Noise lab :	Els Meulemans
Tests :	Measurement of sound absorption in the reverberation room	
Product name :	**SlimBox island ceiling (1060 x 1060 x 42 mm) - air cavity 270 mm**	

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
ISO 12999-2:2020	Acoustics - Determination and application of measurement uncertainties in building acoustics Part 2: Sound absorption

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:	8/10/2022	2022LAB-106
Date of receipt of the specimen(s):	3/05/2023	3
Date of construction:	3/05/2023	
Date of tests:	3/05/2023	
Date of preparation of the test report:	25/09/2023	

The measurements were carried out at Daidalos Peutz Laboratory for Acoustics at Hooglede, see appendix 1
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:	Total volume :	298,3 m³
	Length:	9,99 m
	Width	4,97 m
	Height	5,98 m
	Volume door opening :	1,32 m³
	Total area:	279,9 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) :

$A_1 = 55{,}3\ V / (c_1 T_1) - 4Vm_1$ [m²] (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) :

$A_2 = 55{,}3\ V / (c_2 T_2) - 4Vm_2$ [m²] (2)

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

$A_T = A_2 - A_1 = 55{,}3\ V\ (1/c_2T_2 - 1/c_1T_1) - 4V(m_2 - m_1)$ [m²] (3)

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

$\alpha_S = A_T / S$ (4)

NOTE *For discrete objects A_{obj} is used instead of α_s*
For a specific array of objects the result is given as α_s

The equivalent sound absorption area of discrete absorbers or individual objects shall be calculated using the formula (5):

$A_{obj} = A_T / n$ *where n is the number of tested objects* (5)

whereas:

A_1	=	*The equivalent sound absorption area of the empty reverberation room in square metres*
A_2	=	*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]*
c_1, c_2	=	*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
T_1	=	*the reverberation time, in seconds, of the empty reverberation room*
T_2	=	*the reverberation time, in seconds, of the reverberation room after the test specimen has been introduced*
m_1, m_2	=	*the power attenuation coefficient, in reciprocal metres, calculated according to ISO 9613-1:1993*
A_T	=	*The equivalent sound absorption area of the test specimen in square metres*
S	=	*the area, in square metres, covered by the test specimen*
α_s	=	*the sound absorption coefficient*
A_{obj}	=	*the equivalent sound absorption area per object*
n	=	*the number of tested discrete or individual objects*

SPECIAL MEASUREMENT CONDITIONS

-
-
-
-
-

n/a

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RATING OF SOUND ABSORPTION

A_{obj} EQUIVALENT SOUND ABSORPTION AREA PER OBJECT

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 equivalent sound absorption area for each octave band i, is calculated from the arithmetic mean value of the three one-third octave sound absorption coefficients within the octave. In line with the standard ISO 354, the mean value is calculated to the first decimal.

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.

But an individual object is NOT evaluated with the standard ISO 11654, both in terms of the single-number value and the absorption class.

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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A_{obj} EQUIVALENT SOUND ABSORPTION AREA PER OBJECT

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
Acoustics - Determination and application of measurement uncertainties in building acoustics - Part 2: sound absorption

Identification number of test element: 3 **Test date:** 3/05/2023
Name of test institute : Daidalos Peutz Laboratory of Acoustics, Hooglede, Belgium

Reverberation room:	V =	298,3 m³	S_{tot} =	279,9 m²	
Room conditions during measurements:		Empty room	With testelement		
Temperature:	T =	18,4	16,8	°C	
Atmospheric pressure:	p =	102,4	102,4	kPa	
Relative humidity :	h_r =	58	60	%	

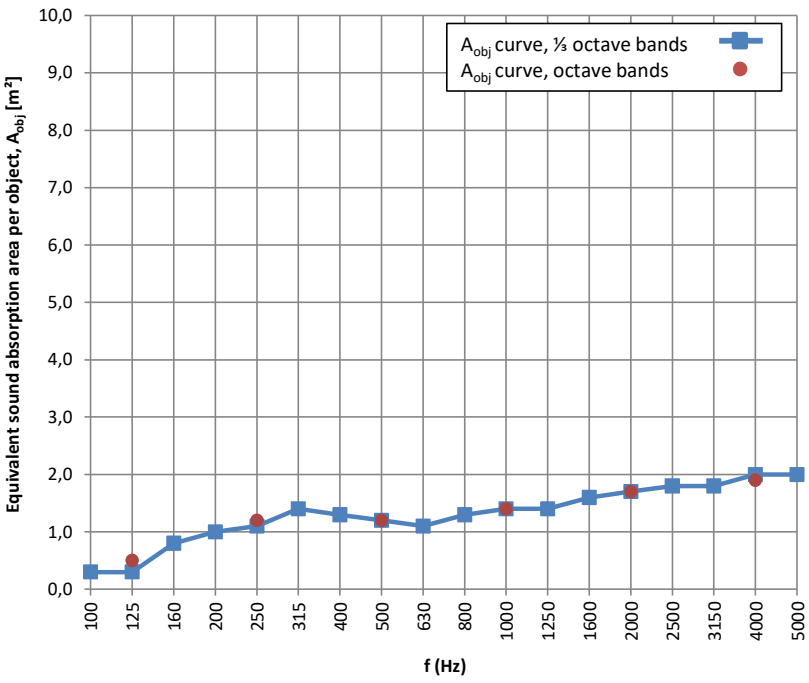
Type of test element: **Discrete object**
Construction characteristics:

Number of tested objects 4
Number of location setups in the reverberation room 1

Test setup: The Slimbox islands were placed loosely on wooden supports, with a height of 270 mm

f(Hz)	T_1 (s)	T_2 (s)	A_{obj} [m²]
50			
63			
80			
100	9,97	8,10	0,3
125	**8,48**	**6,87**	**0,3**
160	8,36	5,50	0,8
200	8,97	5,22	1,0
250	**9,41**	**5,18**	**1,1**
315	9,52	4,60	1,4
400	8,79	4,46	1,3
500	**8,75**	**4,63**	**1,2**
630	8,90	4,88	1,1
800	8,62	4,47	1,3
1000	**8,75**	**4,34**	**1,4**
1250	8,30	4,17	1,4
1600	7,31	3,71	1,6
2000	**6,46**	**3,39**	**1,7**
2500	5,45	3,02	1,8
3150	4,44	2,63	1,8
4000	**3,50**	**2,20**	**2,0**
5000	2,75	1,85	2,0

f(Hz)	A_{obj} [m²]
125	0,5
250	1,2
500	1,2
1000	1,4
2000	1,7
4000	1,9



Note: an individual object is not evaluated according to ISO 11654 (α_w and class)

Requested by: Texdecor,Rue d'Hem, 2,59780 Willems
TESTELEMENT: (product name, for details see Annex 2)

SlimBox island ceiling (1060 x 1060 x 42 mm) - air cavity 270 mm

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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				
63				
80				
100	9,97	0,51	8,10	0,46
125	8,48	0,42	6,87	0,38
160	8,36	0,37	5,50	0,3
200	8,97	0,34	5,22	0,26
250	9,41	0,32	5,18	0,23
315	9,52	0,28	4,60	0,2
400	8,79	0,24	4,46	0,17
500	8,75	0,22	4,63	0,16
630	8,90	0,19	4,88	0,14
800	8,62	0,17	4,47	0,12
1000	8,75	0,15	4,34	0,11
1250	8,30	0,13	4,17	0,09
1600	7,31	0,11	3,71	0,08
2000	6,46	0,09	3,39	0,07
2500	5,45	0,08	3,02	0,06
3150	4,44	0,06	2,63	0,05
4000	3,50	0,05	2,20	0,04
5000	2,75	0,04	1,85	0,03

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	A_{obj} (m²)	ε_{Aobj}	δ_{95} (A_{obj})
50			
63			
80			
100	0,3	0,1	0,1
125	0,3	0,1	0,1
160	0,8	0,1	0,1
200	1,0	0,1	0,1
250	1,1	0,1	0,1
315	1,4	0,1	0,1
400	1,3	0,1	0,1
500	1,2	0,1	0,0
630	1,1	0,1	0,0
800	1,3	0,1	0,0
1000	1,4	0,1	0,0
1250	1,4	0,1	0,0
1600	1,6	0,1	0,0
2000	1,7	0,1	0,0
2500	1,8	0,1	0,0
3150	1,8	0,1	0,0
4000	2,0	0,1	0,1
5000	2,0	0,1	0,1

$\varepsilon(A_{obj})$ = The relative standard deviation of the sound absorption coefficient

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

δ_{95} (A_{obj}) = 95% confidence interval

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

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

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

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laboratory of acoustics

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

NOISE LAB
TEST REPORT Number A-2022LAB-106-3-45049_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

Texdecor - SlimBox ceiling island
manufacturer: Texdecor
Type : acoustic island ceiling
application : ceiling island
composition: Slimbox ceiling islands are made of PET. (lining and acoustic fleece) 60% coming from recycled plastic bottles

The SlimBox ceiling islands are produced frameless in Slimpanel 9 mm (recycled polyester fiber felt) and filled with acoustic fleece.
When installed on ceilings, they are suspended by 4 adjustable cables, allowing you to play with heights and create a rhythm.

The islands used in this test:
With a total thickness of 42 mm, the 9 mm PET surface is combined with an acoustic fleece (+/- 533 g/m², thickness +/- 22,5 mm)
dimensions : 1060 x 1060 x 42 mm

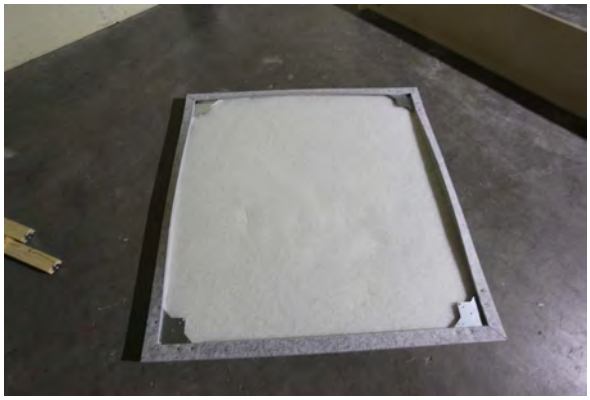
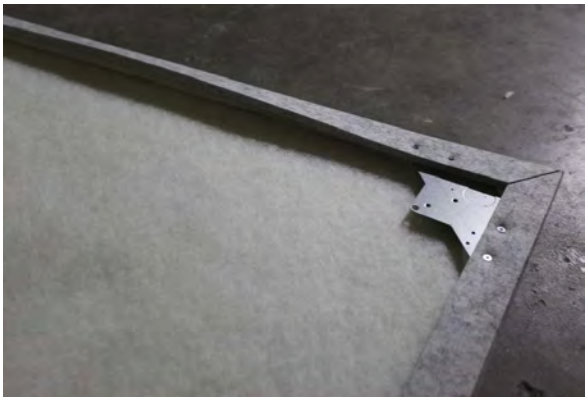


photo : side view of the test object: ceiling island on wooden supports, with a heigth of 270mm



photographs : back of the ceiling island, filled with acoustic fleece

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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

Further information can be obtained directly from the manufacturer.

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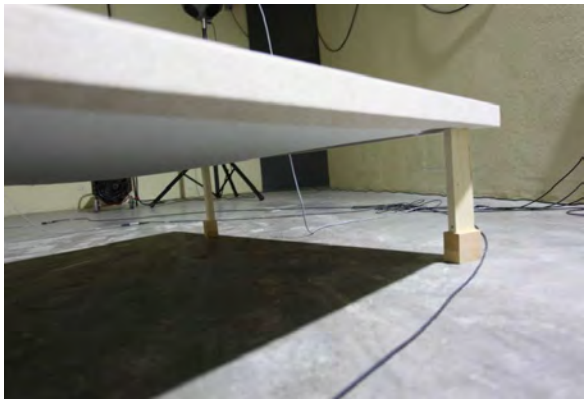
ANNEX 4: photographs of the test element or the test arrangement

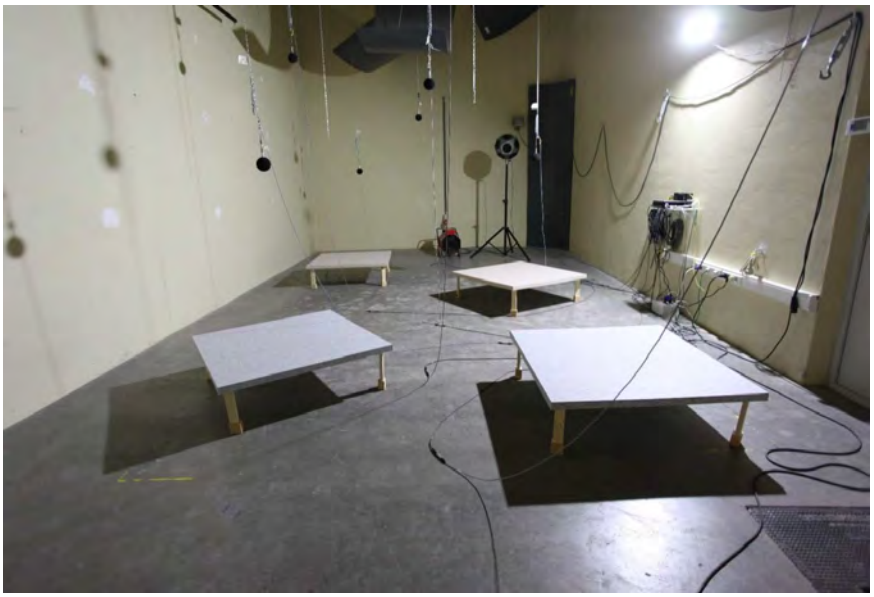
Description of the assembly or drawing or photo

4 SlimBox island ceiling supported on wooden supports, with a heigth of 270mm, were placed in the reverberation room.
The 4 objects were arranged randomly, spaced at least 1 m apart and 1 m away to any other boundary.
The test specimen comprise a sufficient number of individual objects (4 islands) to provide a measurable change in the equivalent sound absorption area of the room, AT .

one object = 1 SlimBox island ceiling with the dimensions of 1060 x 1060 x 42 mm

photographs of the test set-up





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ANNEX 5: Sketch of the test room

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The test room was built and finished according ISO 354.