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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-5-44140_E

Customer :	Texdecor Rue d'Hem, 2 59780 Willems France	
Contacts :	**Client :**	Julie Truquet
	Noise lab :	Els Meulemans
Tests :	Measurement of sound absorption in the reverberation room	
Product name :	**Baffle elements with 12 blades 1200x200mm - made of Slimpanel 9mm - suspension height 500mm**	

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:	7/10/2020	2020LAB-106
Date of receipt of the specimen(s):	5/11/2020	5
Date of construction:	5/11/2020	
Date of tests:	5/11/2020	
Date of preparation of the report:	6/11/2020	

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-5-44140_E

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 :	298,31 m³
	Length:	9,98 m
	Width	4,97 m
	Height	5,99 m
	Volume door niche :	1,32 m³
	Total area:	279,95 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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-5-44140_E

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-5-44140_E

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-5-44140_E

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

Identification number of test element: **5** **Test date:** 5/11/2020

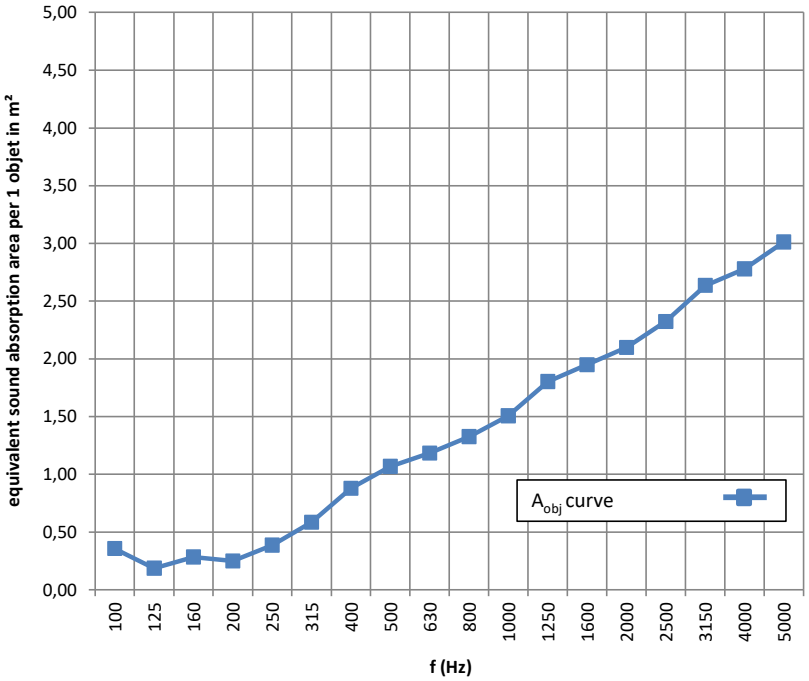
Reverberation room: V = 298,3 m³ S_{tot} = 279,9 m²

Room conditions during measurements:		Empty room	With testelement	
Temperature:	T =	17,7	17,6	°C
Atmospheric pressure:	p =	103,7	103,7	kPa
Relative humidity :	h_r =	62	63	%

Type of test element: **individual object**
Construction characteristics:
* using individual objects
Number of tested objects 2
Number of location setups in the reverberation room 2

f(Hz)	T_1 (s)	T_2 (s)	A_{obj} (m²)
50			
63			
80			
100	12,44	10,51	0,4
125	**10,03**	**9,32**	**0,2**
160	9,81	8,80	0,3
200	9,66	8,79	0,3
250	**10,27**	**8,82**	**0,4**
315	10,18	8,17	0,6
400	9,36	6,98	0,9
500	**9,13**	**6,51**	**1,1**
630	9,81	6,63	1,2
800	9,74	6,35	1,3
1000	**9,69**	**6,05**	**1,5**
1250	8,91	5,35	1,8
1600	7,87	4,82	1,9
2000	**6,86**	**4,30**	**2,1**
2500	5,75	3,71	2,3
3150	4,71	3,12	2,6
4000	**3,81**	**2,65**	**2,8**
5000	2,98	2,18	3,0

f(Hz)	A_{obj} (m²)
125	0,3
250	0,4
500	1,0
1000	1,5
2000	2,1
4000	2,8



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)

Baffle elements with 12 blades 1200x200mm - made of Slimpanel 9mm - suspension height 500mm

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-5-44140_E

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	0,0	0,0
63	0,0	0,0	0,0	0,0
80	0,0	0,0	0,0	0,0
100	12,44	0,57	10,51	0,53
125	10,03	0,46	9,32	0,44
160	9,81	0,40	8,80	0,38
200	9,66	0,36	8,79	0,34
250	10,27	0,33	8,82	0,31
315	10,18	0,29	8,17	0,26
400	9,36	0,25	6,98	0,21
500	9,13	0,22	6,51	0,19
630	9,81	0,20	6,63	0,17
800	9,74	0,18	6,35	0,14
1000	9,69	0,16	6,05	0,13
1250	8,91	0,14	5,35	0,11
1600	7,87	0,11	4,82	0,09
2000	6,86	0,10	4,30	0,08
2500	5,75	0,08	3,71	0,06
3150	4,71	0,06	3,12	0,05
4000	3,81	0,05	2,65	0,04
5000	2,98	0,04	2,18	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} (m^2)	ε_{Aobj}	δ_{95} (A_{obj})
50	0,0	0,0	0,0
63	0,0	0,0	0,0
80	0,0	0,0	0,0
100	0,4	0,1	0,1
125	0,2	0,2	0,1
160	0,3	0,2	0,1
200	0,3	0,1	0,1
250	0,4	0,1	0,1
315	0,6	0,1	0,1
400	0,9	0,1	0,1
500	1,1	0,1	0,1
630	1,2	0,1	0,1
800	1,3	0,1	0,1
1000	1,5	0,1	0,1
1250	1,8	0,1	0,1
1600	1,9	0,1	0,1
2000	2,1	0,1	0,1
2500	2,3	0,1	0,1
3150	2,6	0,1	0,1
4000	2,8	0,2	0,1
5000	3,0	0,2	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

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-5-44140_E

ANNEX 2: Description test items by manufacturer

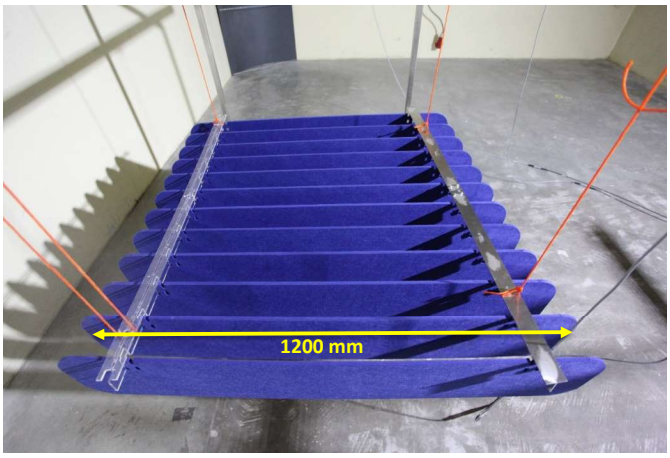
The test sample description given by manufacturer is checked visually as good as possible by the laboratory.
The correspondence between the test element and the commercialized product is the sole responsibility of the manufacturer

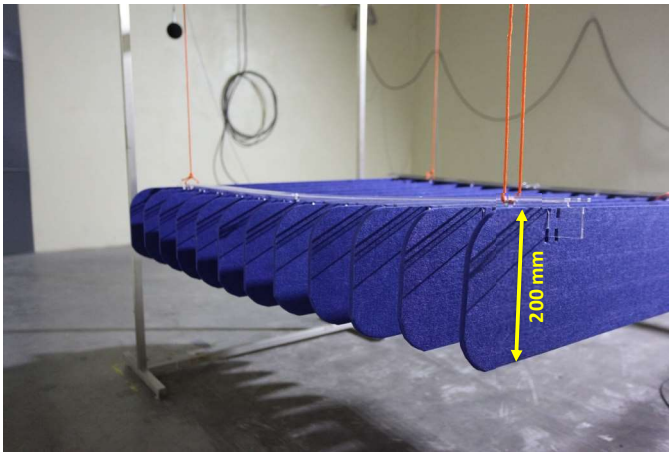
Baffle elements with 12 blades 1200x200mm - made of Slimpanel 9mm - suspension height 500mm

SlimPanel - felt with recycled polyester fibres (PET)
Thickness : 9mm
Mass per unit area : 1900 g/m²

Baffle element with 12 blades of 1200x200mm
Distance between the different blades was 90mm
Suspension height : 500mm from the floor of the reverberation room and lower edge of the blades

Product specifications are based on client's declaration





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

daidalos peutz
laboratory of acoustics

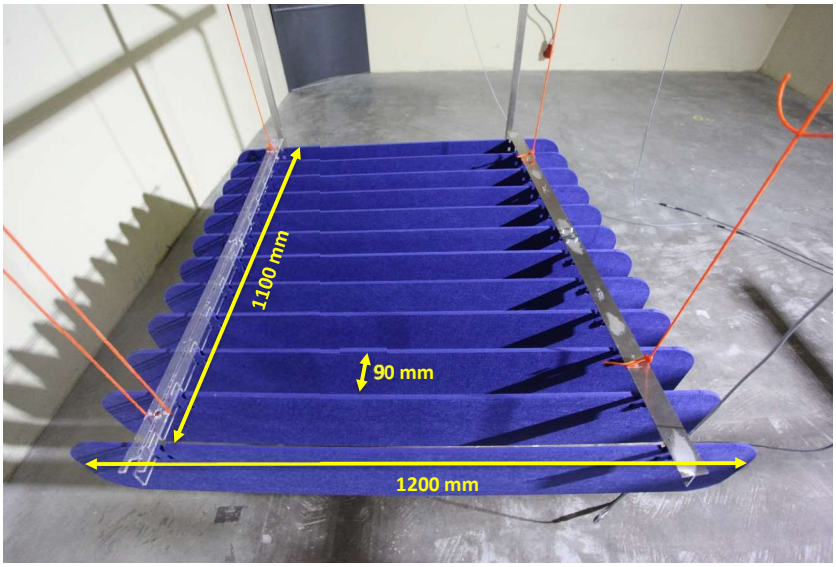
N° 451-TEST
NBN EN ISO 17025:2017
EA MLA signatory

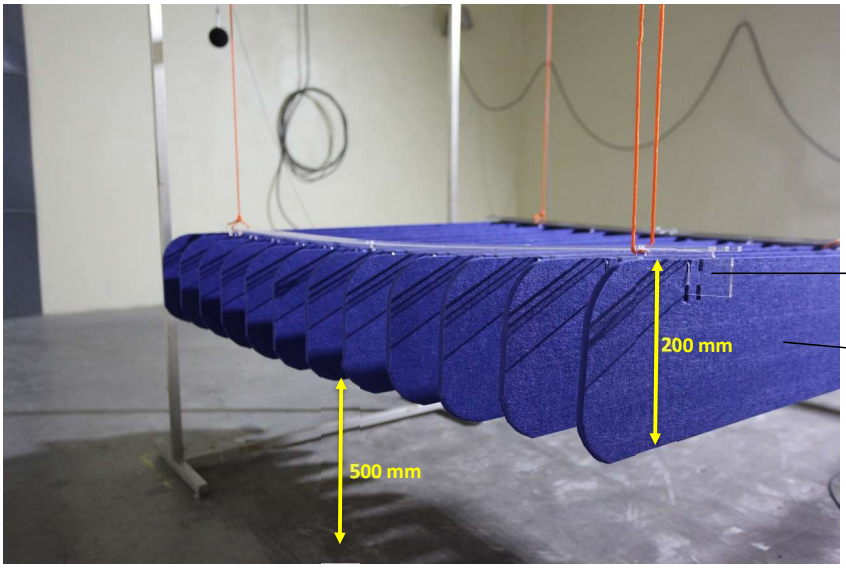
NOISE LAB
REPORT Number A-2020LAB-106-5-44140_E

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





1 object = 1 baffle element with 12 blades

plastic hanger profile

9mm thickness SlimPanel blade 1200x200mm

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-5-44140_E

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

Description of the assembly or drawing or photo

Two baffle elements were tested as individual objects, arranged randomly in the reverberation room, spaced at least 2 m apart,
in accordance with the EN ISO 354 standard
In this test one object = 1 baffle element with 12 blades of 1200x200mm

Two baffle elements were randomly hung up on a separate frame in the reverberation room.
The baffle elements were mounted 500mm above the room floor using mettalic posts the way that specimen sides wouldn't parallel to the side walls of the room.
Suspension height : 500mm from the floor of the reverberation room and lower edge of the blades
Because only 2 individual objects were tested, both were tested on a second location, and the results were averaged

photo : testarrangement with 2 objects on test setup 1

photo : testarrangement with 2 objects on test setup 2

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

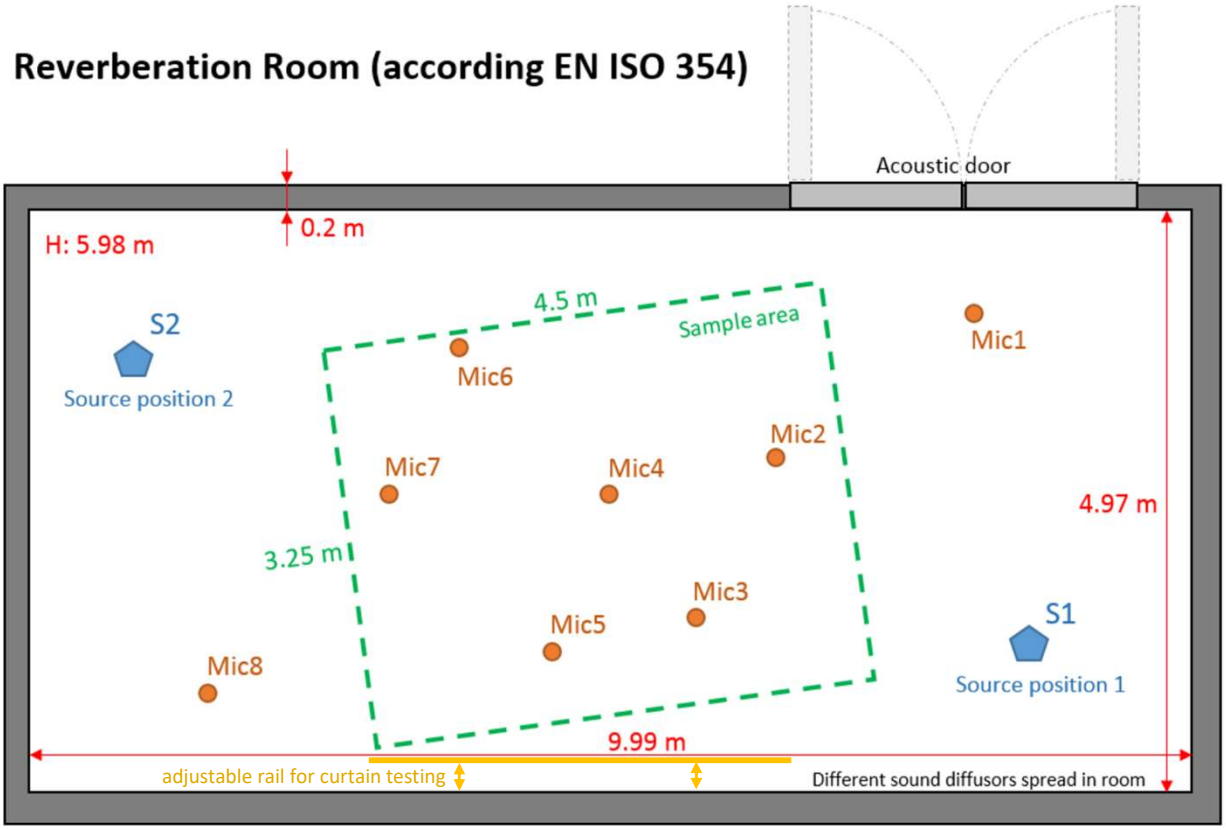
daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-5-44140_E

ANNEX 4: Sketch of the test room

The test room was built and finished according ISO 354.



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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-03-44028_E

Customer :	Texdecor Rue d'Hem, 2 59780 Willems France	
Contacts :	**Client :**	Julie Truquet
	Noise lab :	Els Meulemans
Tests :	Measurement of sound absorption in the reverberation room	
Product name :	**Baffle elements with 12 blades of 1200 x 300 mm - made of Slimpanel 9mm - suspension height 500mm**	

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:	21/02/2020	2020LAB-011
Date of receipt of the specimen(s):	16/07/2020	03
Date of construction:	16/07/2020	
Date of tests:	16/07/2020	
Date of preparation of the report:	6/11/2020	

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-03-44028_E

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 :	298,31 m³
	Length:	9,98 m
	Width	4,97 m
	Height	5,99 m
	Volume door niche :	1,32 m³
	Total area:	279,95 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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-03-44028_E

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-03-44028_E

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-03-44028_E

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

Identification number of test element: **03** **Test date:** 16/07/2020

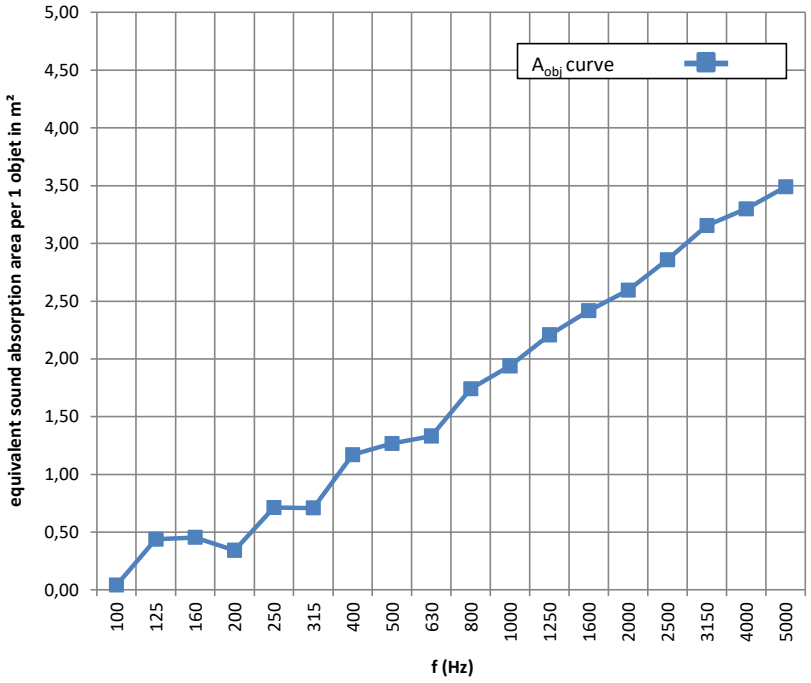
Reverberation room: V = 298,3 m³ S_{tot} = 279,9 m²

Room conditions during measurements:		Empty room	With testelement	
Temperature:	T =	21,0	21,0	°C
Atmospheric pressure:	p =	101,5	101,6	kPa
Relative humidity :	h_r =	69	69	%

Type of test element: **individual object**
Construction characteristics:
* using individual objects
Number of tested objects 2
Number of location setups in the reverberation room 2

f(Hz)	T_1 (s)	T_2 (s)	A_{obj} (m²)
50			
63			
80			
100	10,93	10,73	0,0
125	**9,62**	**8,19**	**0,4**
160	9,43	8,00	0,5
200	9,92	8,69	0,3
250	**9,88**	**7,64**	**0,7**
315	9,51	7,42	0,7
400	8,89	6,20	1,2
500	**8,87**	**6,04**	**1,3**
630	9,08	6,04	1,3
800	9,02	5,45	1,7
1000	**8,84**	**5,16**	**1,9**
1250	8,30	4,71	2,2
1600	7,51	4,28	2,4
2000	**6,66**	**3,87**	**2,6**
2500	5,75	3,41	2,9
3150	4,89	2,98	3,2
4000	**4,08**	**2,62**	**3,3**
5000	3,24	2,20	3,5

f(Hz)	A_{obj} (m²)
125	0,3
250	0,6
500	1,3
1000	2,0
2000	2,6
4000	3,3



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)

Baffle elements with 12 blades of 1200 x 300 mm - made of Slimpanel 9mm - suspension height 500mm

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-03-44028_E

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	0,0	0,0
63	0,0	0,0	0,0	0,0
80	0,0	0,0	0,0	0,0
100	10,93	0,54	10,73	0,53
125	9,62	0,45	8,19	0,42
160	9,43	0,39	8,00	0,36
200	9,92	0,36	8,69	0,34
250	9,88	0,32	7,64	0,28
315	9,51	0,28	7,42	0,25
400	8,89	0,24	6,20	0,20
500	8,87	0,22	6,04	0,18
630	9,08	0,20	6,04	0,16
800	9,02	0,17	5,45	0,13
1000	8,84	0,15	5,16	0,12
1250	8,30	0,13	4,71	0,10
1600	7,51	0,11	4,28	0,08
2000	6,66	0,09	3,87	0,07
2500	5,75	0,08	3,41	0,06
3150	4,89	0,06	2,98	0,05
4000	4,08	0,05	2,62	0,04
5000	3,24	0,04	2,20	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} (m^2)	ε_{Aobj}	$\delta_{95}(A_{obj})$
50	0,0	0,0	0,0
63	0,0	0,0	0,0
80	0,0	0,0	0,0
100	0,0	0,2	0,1
125	0,4	0,2	0,1
160	0,5	0,2	0,1
200	0,3	0,1	0,1
250	0,7	0,1	0,1
315	0,7	0,1	0,1
400	1,2	0,1	0,1
500	1,3	0,1	0,1
630	1,3	0,1	0,1
800	1,7	0,1	0,1
1000	1,9	0,1	0,1
1250	2,2	0,1	0,1
1600	2,4	0,1	0,1
2000	2,6	0,1	0,1
2500	2,9	0,1	0,1
3150	3,2	0,1	0,1
4000	3,3	0,2	0,1
5000	3,5	0,2	0,1

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

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

$\delta_{95}(A_{obj})$ = 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

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-03-44028_E

ANNEX 2: Description test items by manufacturer

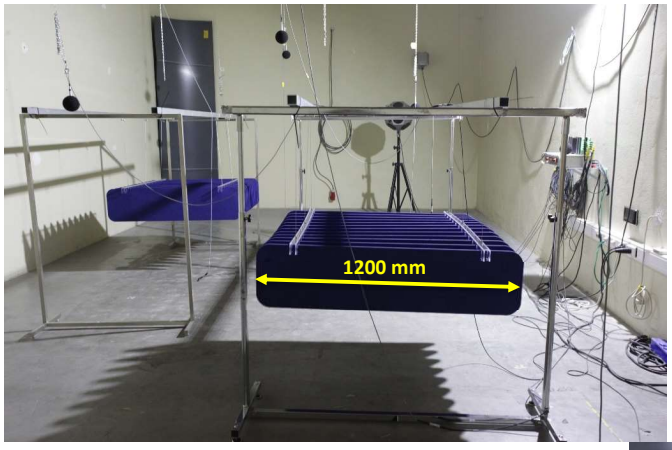
The test sample description given by manufacturer is checked visually as good as possible by the laboratory.
The correspondence between the test element and the commercialized product is the sole responsibility of the manufacturer

Baffle elements with 12 blades of 1200 x 300 mm - made of Slimpanel 9mm - suspension height 500mm

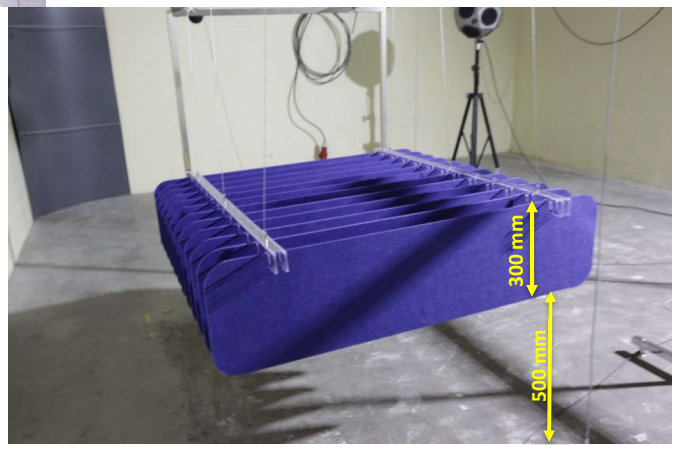
SlimPanel - felt with recycled polyester fibres (PET)
Thickness : 9mm
Mass per unit area : 1900 g/m²

Baffle element with 12 blades of 1200 x 300 mm
Distance between the different blades was 90mm
Suspension height : 500mm from the floor of the reverberation room and lower edge of the blades

Product specifications are based on client's declaration



1 object = 1 baffle element with 12 blades of 1200 x 400 mm



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

daidalos peutz
laboratory of acoustics

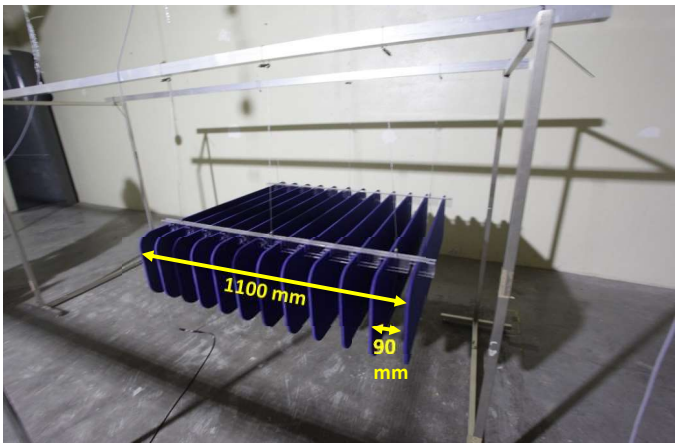
N° 451-TEST
NBN EN ISO 17025:2017
EA MLA signatory

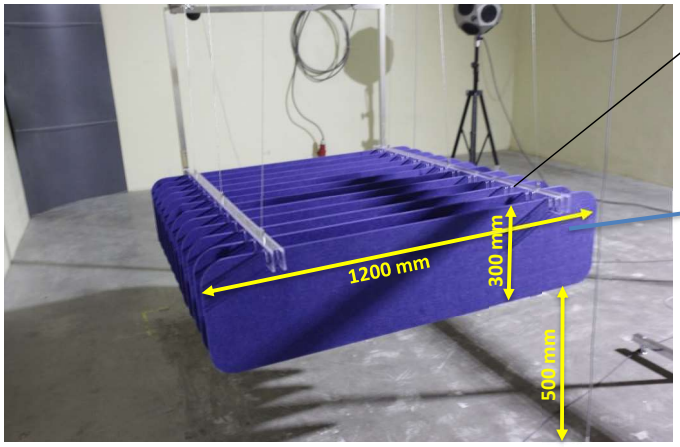
NOISE LAB
REPORT Number A-2020LAB-011-03-44028_E

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





plastic hanger profile

9mm thickness SlimPanel blade 1200x300mm

1 object = 1 baffle element with 12 blades

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-03-44028_E

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

Description of the assembly or drawing or photo

Two baffle elements were tested as individual objects, arranged randomly in the reverberation room, spaced at least 2 m apart,
in accordance with the EN ISO 354 standard
In this test one object = 1 baffle element with 12 blades of 1200 x 300 mm

Two baffle elements were randomly hung up on a separate frame in the reverberation room.
The baffle elements were mounted 500mm above the room floor using mettalic posts the way that specimen sides wouldn't parallel to the side walls of the room.
Suspension height : 500mm from the floor of the reverberation room and lower edge of the blades

photo : testarrangement with 2 objects on test setup 1

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

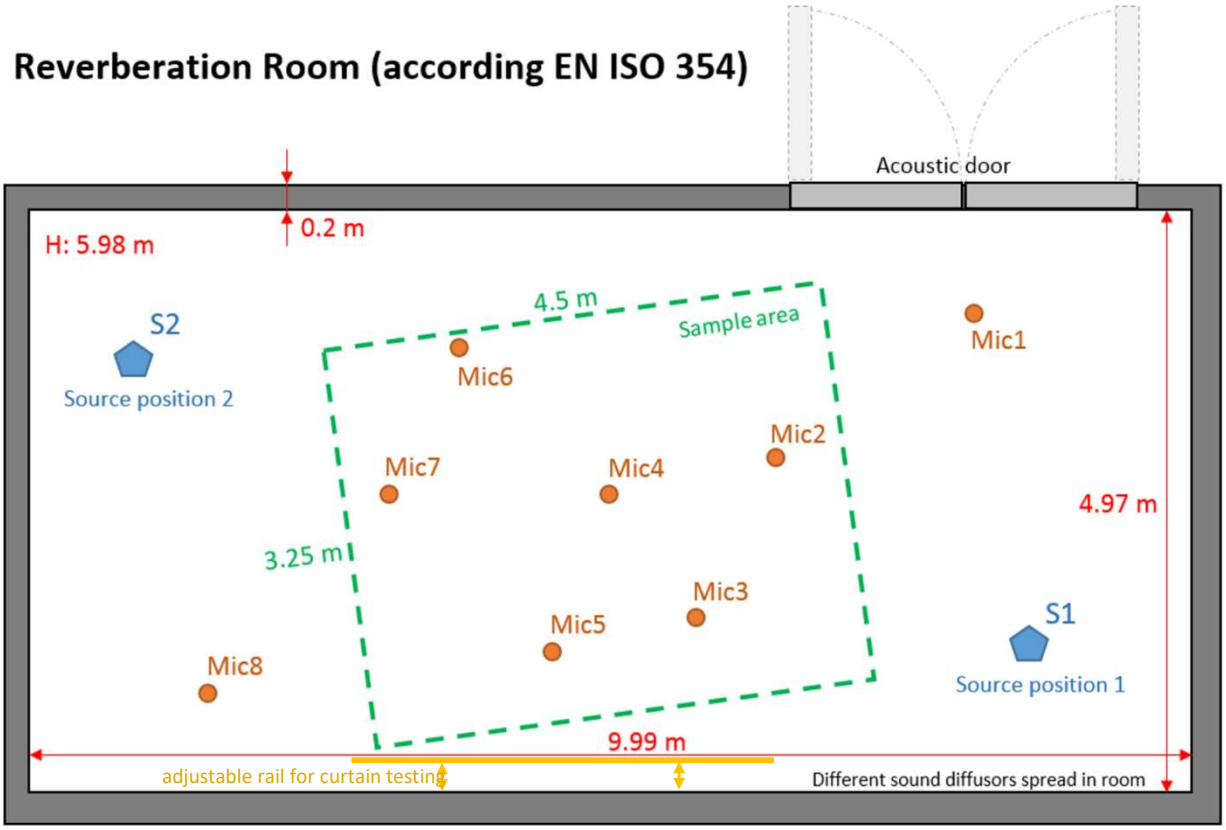
daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-03-44028_E

ANNEX 4: Sketch of the test room

The test room was built and finished according ISO 354.



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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-8-44141_E

Customer :	Texdecor Rue d'Hem, 2 59780 Willems France	
Contacts :	**Client :**	Julie Truquet
	Noise lab :	Els Meulemans
Tests :	Measurement of sound absorption in the reverberation room	
Product name :	**Baffle elements with 12 blades of 1200 x 400 mm - made of Slimpanel 9mm - suspension height 500mm**	

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:	7/10/2020	2020LAB-106
Date of receipt of the specimen(s):	5/11/2020	8
Date of construction:	6/11/2020	
Date of tests:	6/11/2020	
Date of preparation of the report:	6/11/2020	

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-8-44141_E

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 :	298,31 m³
	Length:	9,98 m
	Width	4,97 m
	Height	5,99 m
	Volume door niche :	1,32 m³
	Total area:	279,95 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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-8-44141_E

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-8-44141_E

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-8-44141_E

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

Identification number of test element: **8** **Test date:** 6/11/2020

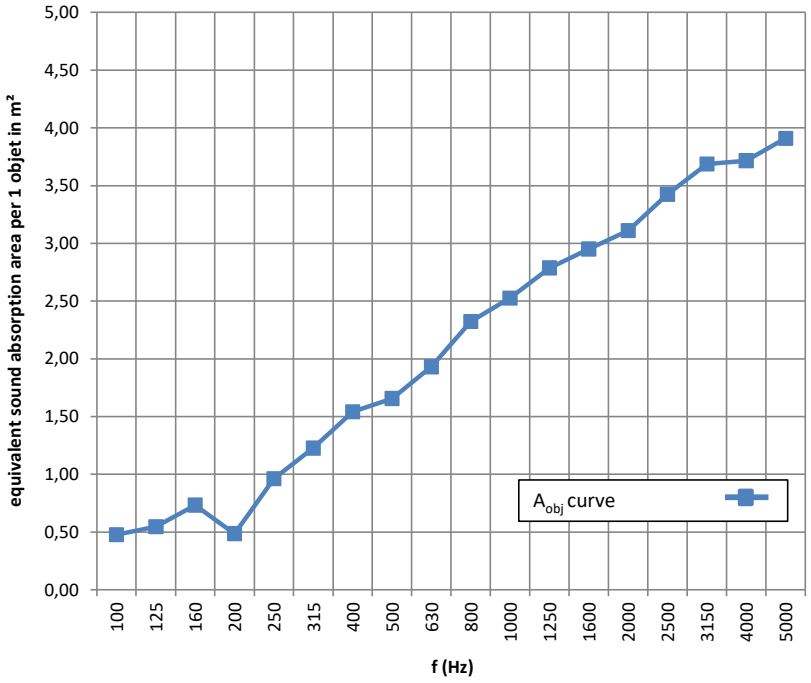
Reverberation room: V = 298,3 m³ S_{tot} = 279,9 m²

Room conditions during measurements:		Empty room	With testelement	
Temperature:	T =	17,5	17,2	°C
Atmospheric pressure:	p =	103,6	103,0	kPa
Relative humidity :	h_r =	64	65	%

Type of test element: **individual object**
Construction characteristics:
* using individual objects
Number of tested objects 2
Number of location setups in the reverberation room 2

f(Hz)	T_1 (s)	T_2 (s)	A_{obj} (m²)
50			
63			
80			
100	12,44	9,99	0,5
125	**10,03**	**8,18**	**0,5**
160	9,81	7,56	0,7
200	9,66	8,09	0,5
250	**10,27**	**7,29**	**1,0**
315	10,18	6,71	1,2
400	9,36	5,86	1,5
500	**9,13**	**5,62**	**1,7**
630	9,81	5,50	1,9
800	9,74	5,03	2,3
1000	**9,69**	**4,82**	**2,5**
1250	8,91	4,39	2,8
1600	7,87	4,01	3,0
2000	**6,86**	**3,64**	**3,1**
2500	5,75	3,16	3,4
3150	4,71	2,73	3,7
4000	**3,81**	**2,39**	**3,7**
5000	2,98	2,00	3,9

f(Hz)	A_{obj} (m²)
125	0,6
250	0,9
500	1,7
1000	2,5
2000	3,2
4000	3,8



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)

Baffle elements with 12 blades of 1200 x 400 mm - made of Slimpanel 9mm - suspension height 500mm

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-8-44141_E

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	0,0	0,0
63	0,0	0,0	0,0	0,0
80	0,0	0,0	0,0	0,0
100	12,44	0,57	9,99	0,51
125	10,03	0,46	8,18	0,42
160	9,81	0,40	7,56	0,35
200	9,66	0,36	8,09	0,33
250	10,27	0,33	7,29	0,28
315	10,18	0,29	6,71	0,24
400	9,36	0,25	5,86	0,20
500	9,13	0,22	5,62	0,17
630	9,81	0,20	5,50	0,15
800	9,74	0,18	5,03	0,13
1000	9,69	0,16	4,82	0,11
1250	8,91	0,14	4,39	0,10
1600	7,87	0,11	4,01	0,08
2000	6,86	0,10	3,64	0,07
2500	5,75	0,08	3,16	0,06
3150	4,71	0,06	2,73	0,05
4000	3,81	0,05	2,39	0,04
5000	2,98	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} (m^2)	ε_{Aobj}	$\delta_{95}(A_{obj})$
50	0,0	0,0	0,0
63	0,0	0,0	0,0
80	0,0	0,0	0,0
100	0,5	0,2	0,1
125	0,5	0,2	0,1
160	0,7	0,2	0,1
200	0,5	0,2	0,1
250	1,0	0,1	0,1
315	1,2	0,1	0,1
400	1,5	0,2	0,1
500	1,7	0,1	0,1
630	1,9	0,1	0,1
800	2,3	0,1	0,1
1000	2,5	0,1	0,1
1250	2,8	0,1	0,1
1600	3,0	0,1	0,1
2000	3,1	0,1	0,1
2500	3,4	0,2	0,1
3150	3,7	0,2	0,1
4000	3,7	0,2	0,1
5000	3,9	0,2	0,1

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

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

$\delta_{95}(A_{obj})$ = 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

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-8-44141_E

ANNEX 2: Description test items by manufacturer

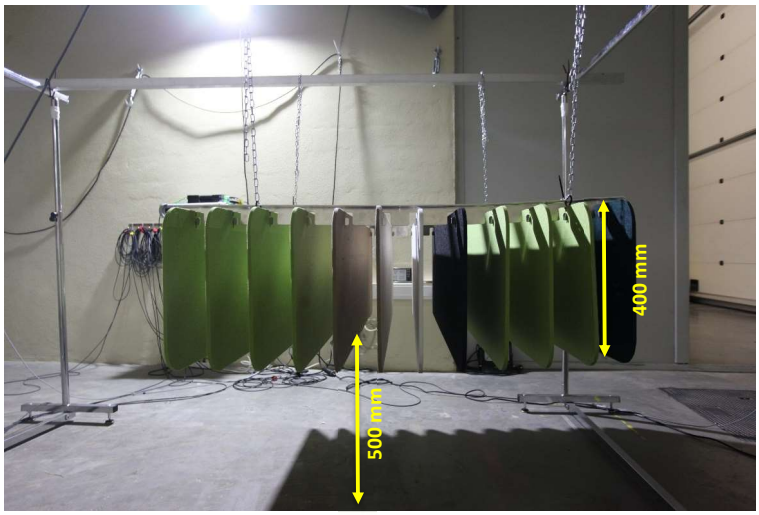
The test sample description given by manufacturer is checked visually as good as possible by the laboratory.
The correspondence between the test element and the commercialized product is the sole responsibility of the manufacturer

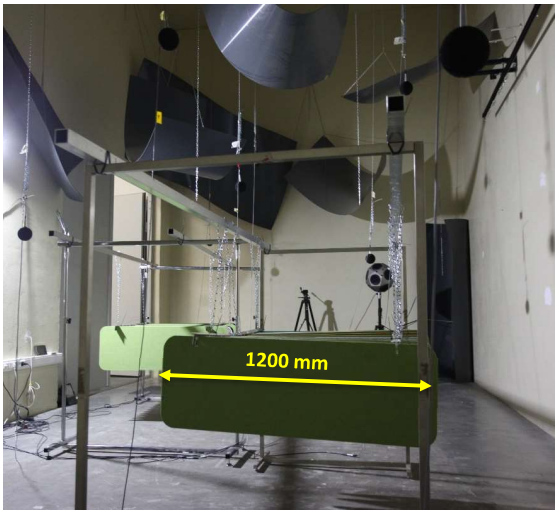
Baffle elements with 12 blades of 1200 x 400 mm - made of Slimpanel 9mm - suspension height 500mm

SlimPanel - felt with recycled polyester fibres (PET)
Thickness : 9mm
Mass per unit area : 1900 g/m²

Baffle element with 12 blades of 1200 x 400 mm
Distance between the different blades was 90mm
Suspension height : 500mm from the floor of the reverberation room and lower edge of the blades

Product specifications are based on client's declaration





1 object = 1 baffle element with 12 blades of 1200 x 400 mm

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

daidalos peutz
laboratory of acoustics

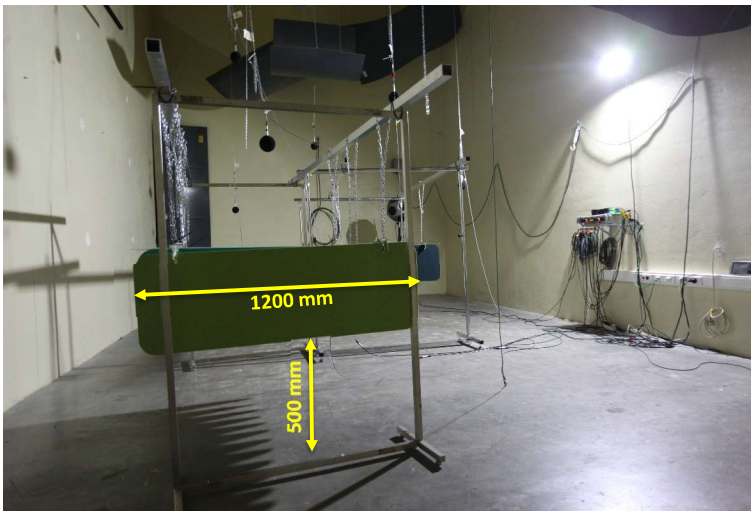
N° 451-TEST
NBN EN ISO 17025:2017
EA MLA signatory

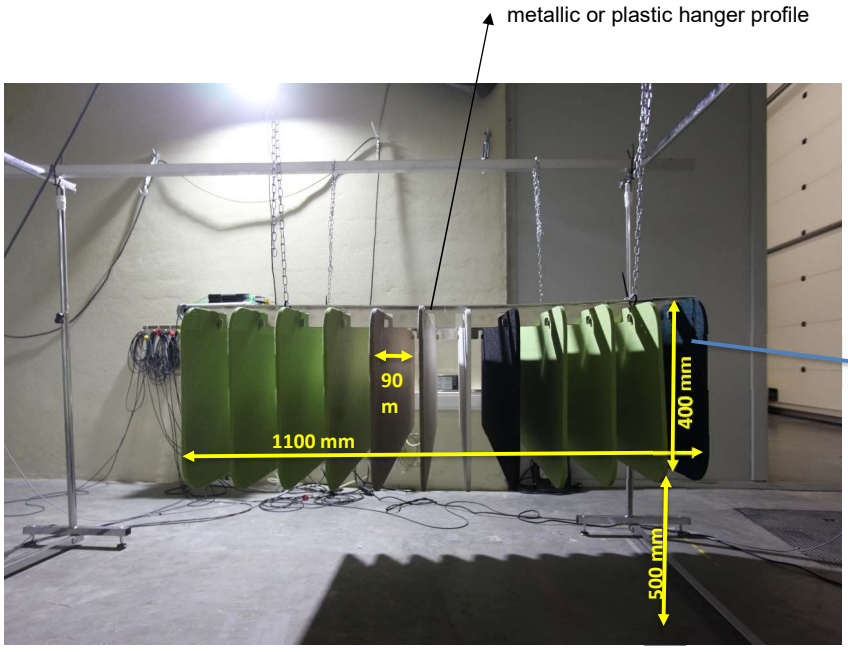
NOISE LAB
REPORT Number A-2020LAB-106-8-44141_E

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





1 object = 1 baffle element with 12 blades

9mm thickness SlimPanel blade 1200x400mm

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-8-44141_E

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

Description of the assembly or drawing or photo

Two baffle elements were tested as individual objects, arranged randomly in the reverberation room, spaced at least 2 m apart,
in accordance with the EN ISO 354 standard
In this test one object = 1 baffle element with 12 blades of 1200 x 400 mm

Two baffle elements were randomly hung up on a separate frame in the reverberation room.
The baffle elements were mounted 500mm above the room floor using mettalic posts the way that specimen sides wouldn't parallel to the side walls of the room.
Suspension height : 500mm from the floor of the reverberation room and lower edge of the blades
Because only 2 individual objects were tested, both were tested on a second location, and the results were averaged

photo : testarrangement with 2 objects on test setup 1

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

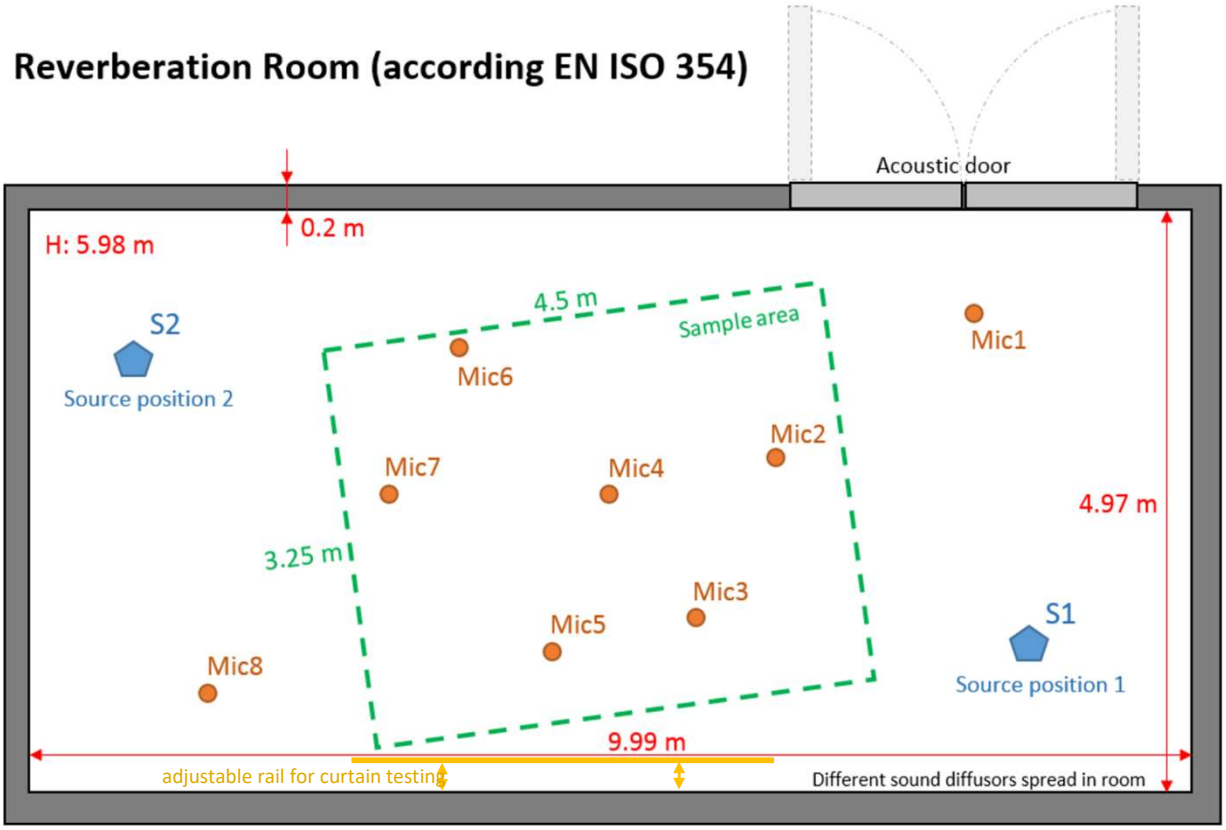
daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-8-44141_E

ANNEX 4: Sketch of the test room

The test room was built and finished according ISO 354.



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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-10-44141_E

Customer :	Texdecor Rue d'Hem, 2 59780 Willems France	
Contacts :	**Client :**	Julie Truquet
	Noise lab :	Els Meulemans
Tests :	Measurement of sound absorption in the reverberation room	
Product name :	**Baffle elements with 12 alternating blades 1200x(300/200) mm - made of Slimpanel 9mm - suspension height 500mm**	

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:	7/10/2020	2020LAB-106
Date of receipt of the specimen(s):	5/11/2020	10
Date of construction:	6/11/2020	
Date of tests:	6/11/2020	
Date of preparation of the report:	6/11/2020	

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-10-44141_E

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 :	298,31 m³
	Length:	9,98 m
	Width	4,97 m
	Height	5,99 m
	Volume door niche :	1,32 m³
	Total area:	279,95 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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-10-44141_E

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):

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

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

-
-
-
-
-

n/a

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-10-44141_E

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-10-44141_E

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

Identification number of test element: **10** **Test date:** 6/11/2020

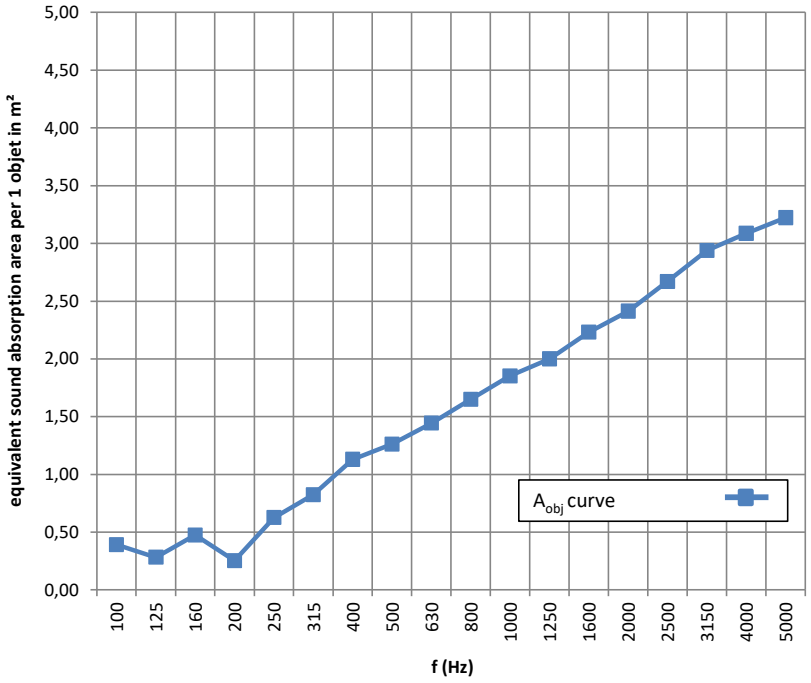
Reverberation room: V = 298,3 m³ S_{tot} = 279,9 m²

Room conditions during measurements:		Empty room	With testelement	
Temperature:	T =	17,5	17,2	°C
Atmospheric pressure:	p =	103,6	103,0	kPa
Relative humidity :	h_r =	64	63	%

Type of test element: **individual object**
Construction characteristics:
* using individual objects
Number of tested objects 2
Number of location setups in the reverberation room 2

f(Hz)	T_1 (s)	T_2 (s)	A_{obj} (m²)
50			
63			
80			
100	12,44	10,36	0,4
125	**10,03**	**8,98**	**0,3**
160	9,81	8,23	0,5
200	9,66	8,77	0,3
250	**10,27**	**8,10**	**0,6**
315	10,18	7,55	0,8
400	9,36	6,50	1,1
500	**9,13**	**6,18**	**1,3**
630	9,81	6,18	1,4
800	9,74	5,85	1,6
1000	**9,69**	**5,55**	**1,9**
1250	8,91	5,12	2,0
1600	7,87	4,54	2,2
2000	**6,86**	**4,05**	**2,4**
2500	5,75	3,49	2,7
3150	4,71	2,97	2,9
4000	**3,81**	**2,53**	**3,1**
5000	2,98	2,10	3,2

f(Hz)	A_{obj} (m²)
125	0,4
250	0,6
500	1,3
1000	1,8
2000	2,4
4000	3,1



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)

Baffle elements with 12 alternating blades 1200x(300/200) mm - made of Slimpanel 9mm - suspension height 500mm

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-10-44141_E

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	0,0	0,0
63	0,0	0,0	0,0	0,0
80	0,0	0,0	0,0	0,0
100	12,44	0,57	10,36	0,52
125	10,03	0,46	8,98	0,44
160	9,81	0,40	8,23	0,37
200	9,66	0,36	8,77	0,34
250	10,27	0,33	8,10	0,29
315	10,18	0,29	7,55	0,25
400	9,36	0,25	6,50	0,21
500	9,13	0,22	6,18	0,18
630	9,81	0,20	6,18	0,16
800	9,74	0,18	5,85	0,14
1000	9,69	0,16	5,55	0,12
1250	8,91	0,14	5,12	0,10
1600	7,87	0,11	4,54	0,09
2000	6,86	0,10	4,05	0,07
2500	5,75	0,08	3,49	0,06
3150	4,71	0,06	2,97	0,05
4000	3,81	0,05	2,53	0,04
5000	2,98	0,04	2,10	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	Aobj (m²)	ε_{Aobj}	δ_{95} (Aobj)
50	0,0	0,0	0,0
63	0,0	0,0	0,0
80	0,0	0,0	0,0
100	0,4	0,1	0,1
125	0,3	0,2	0,1
160	0,5	0,2	0,1
200	0,3	0,1	0,1
250	0,6	0,1	0,1
315	0,8	0,1	0,1
400	1,1	0,1	0,1
500	1,3	0,1	0,1
630	1,4	0,1	0,1
800	1,6	0,1	0,1
1000	1,9	0,1	0,1
1250	2,0	0,1	0,1
1600	2,2	0,1	0,1
2000	2,4	0,1	0,1
2500	2,7	0,1	0,1
3150	2,9	0,2	0,1
4000	3,1	0,2	0,1
5000	3,2	0,2	0,1

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

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

$\delta_{95}(\alpha)$ = 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

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-10-44141_E

ANNEX 2: Description test items by manufacturer

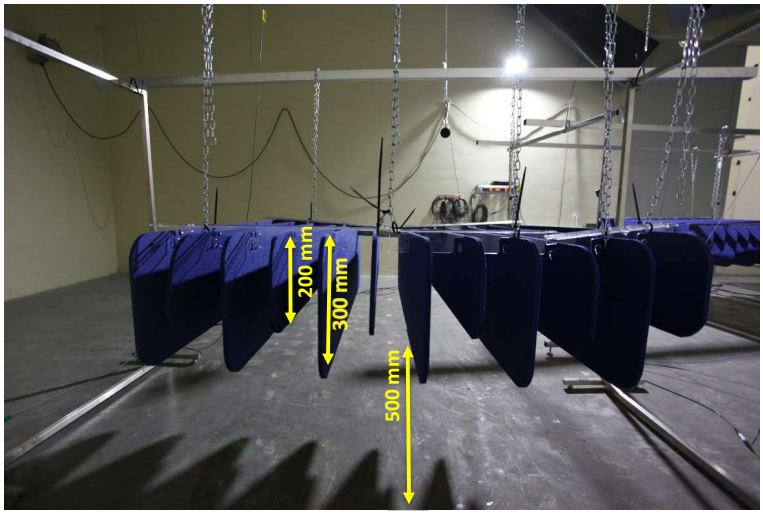
The test sample description given by manufacturer is checked visually as good as possible by the laboratory.
The correspondence between the test element and the commercialized product is the sole responsibility of the manufacturer

Baffle elements with 12 alternating blades 1200x(300/200) mm - made of Slimpanel 9mm - suspension height 500mm

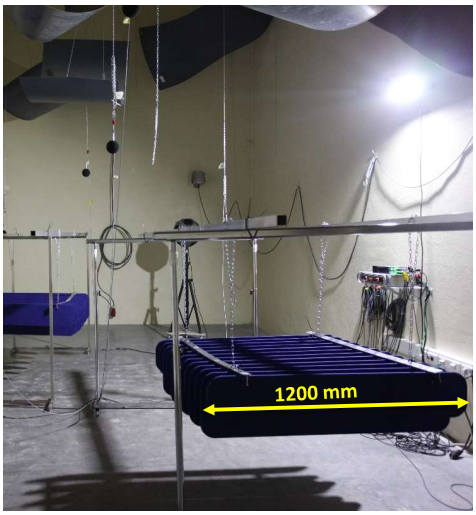
SlimPanel - felt with recycled polyester fibres (PET)
Thickness : 9mm
Mass per unit area : 1900 g/m²

Baffle element with 12 blades: alternating 6 blades of 1200x300mm and 6 bades of 1200x200mm
Distance between the different blades was 90mm
Suspension height : 500mm from the floor of the reverberation room and lower edge of the blades of 300 mm

Product specifications are based on client's declaration



1 object = 1 baffle element with 12 alternating blades of 1200 x (300/200)mm



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

daidalos peutz
laboratory of acoustics

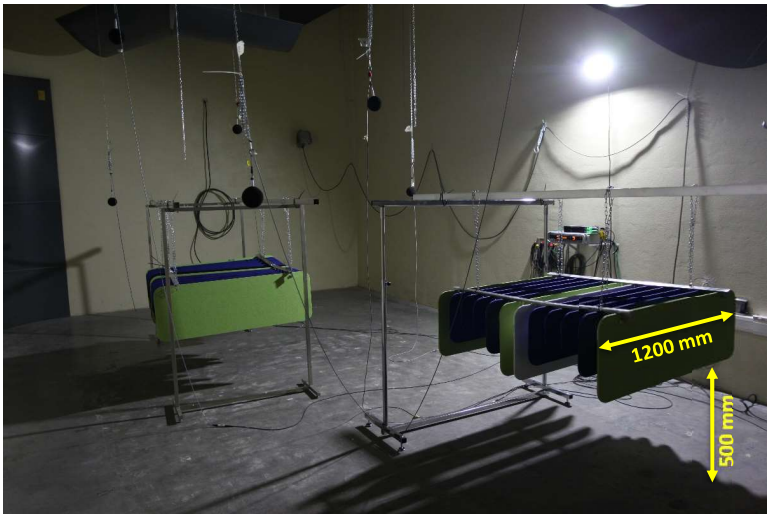
N° 451-TEST
NBN EN ISO 17025:2017
EA MLA signatory

NOISE LAB
REPORT Number A-2020LAB-106-10-44141_E

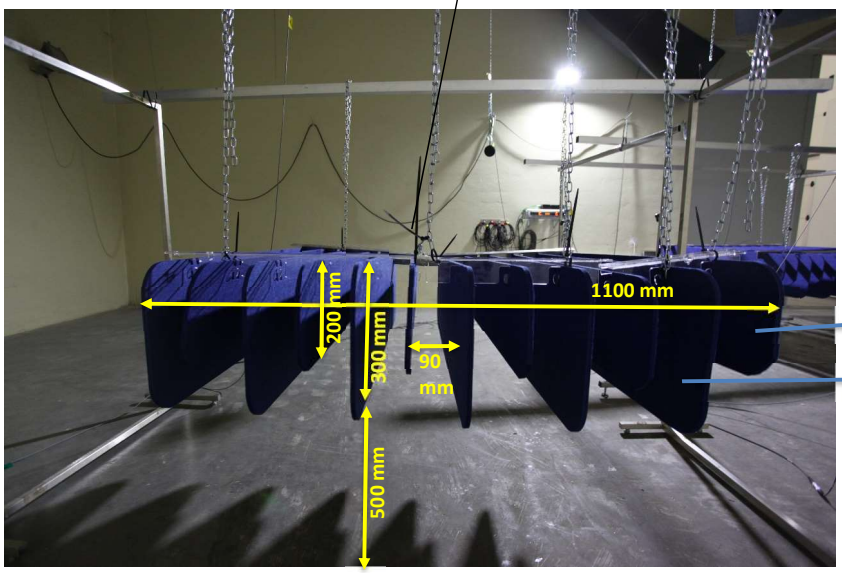
ANNEX 3: Technical datasheet

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



metallic or plastic hanger profile



1 object = 1 baffle element with 12 blades

9mm thickness SlimPanel blade 1200x200mm

9mm thickness SlimPanel blade 1200x300mm

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-10-44141_E

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

Description of the assembly or drawing or photo

Two baffle elements were tested as individual objects, arranged randomly in the reverberation room, spaced at least 2 m apart,
in accordance with the EN ISO 354 standard
In this test one object = 1 baffle element with 12 blades (alternating 1200 x 300/200mm)

Two baffle elements were randomly hung up on a separate frame in the reverberation room.
The baffle elements were mounted 500mm above the room floor using mettalic posts the way that specimen sides wouldn't parallel to the side walls of the room.
Suspension height : 500mm from the floor of the reverberation room and lower edge of the blades of 300mm
Because only 2 individual objects were tested, both were tested on a second location, and the results were averaged

photo : testarrangement with 2 objects on test setup 1

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

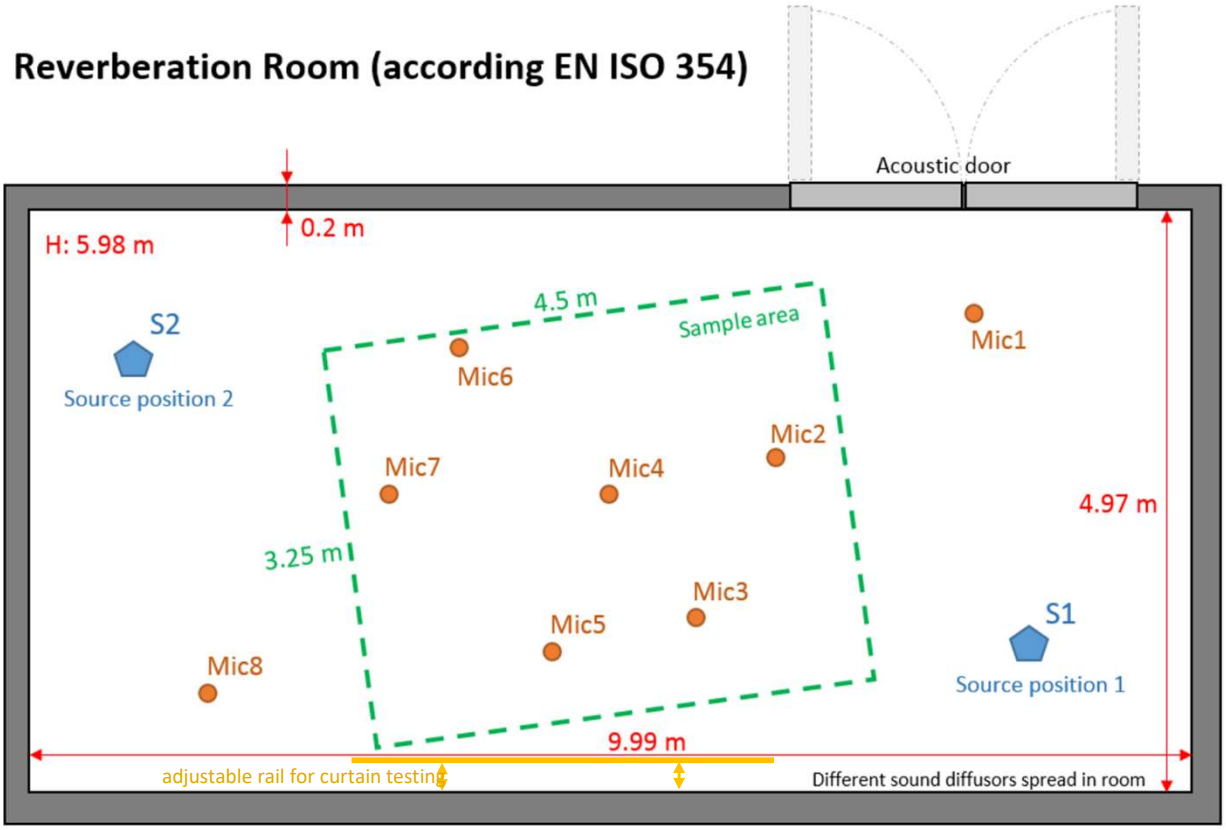
daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-10-44141_E

ANNEX 4: Sketch of the test room

The test room was built and finished according ISO 354.



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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-10-44141_E

Customer :	Texdecor Rue d'Hem, 2 59780 Willems France	
Contacts :	**Client :**	Julie Truquet
	Noise lab :	Els Meulemans
Tests :	Measurement of sound absorption in the reverberation room	
Product name :	**Baffle elements with 12 alternating blades 1200x(300/200) mm - made of Slimpanel 9mm - suspension height 500mm**	

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:	7/10/2020	2020LAB-106
Date of receipt of the specimen(s):	5/11/2020	10
Date of construction:	6/11/2020	
Date of tests:	6/11/2020	
Date of preparation of the report:	6/11/2020	

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-10-44141_E

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 :	298,31 m³
	Length:	9,98 m
	Width	4,97 m
	Height	5,99 m
	Volume door niche :	1,32 m³
	Total area:	279,95 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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-10-44141_E

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):

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

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

-
-
-
-
-

n/a

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-10-44141_E

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-10-44141_E

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

Identification number of test element: **10** **Test date:** 6/11/2020

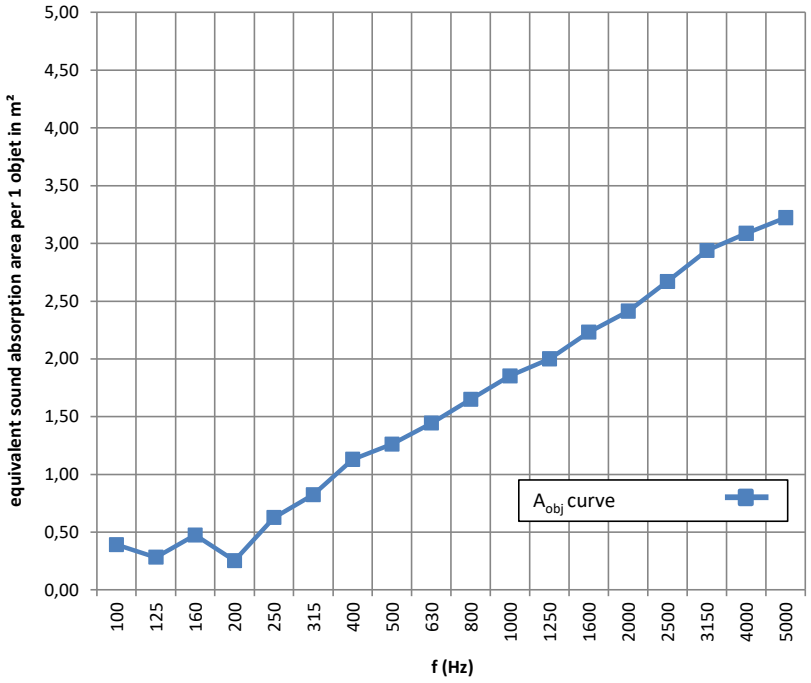
Reverberation room: V = 298,3 m³ S_{tot} = 279,9 m²

Room conditions during measurements:		Empty room	With testelement	
Temperature:	T =	17,5	17,2	°C
Atmospheric pressure:	p =	103,6	103,0	kPa
Relative humidity :	h_r =	64	63	%

Type of test element: **individual object**
Construction characteristics:
* using individual objects
Number of tested objects 2
Number of location setups in the reverberation room 2

f(Hz)	T_1 (s)	T_2 (s)	A_{obj} (m²)
50			
63			
80			
100	12,44	10,36	0,4
125	**10,03**	**8,98**	**0,3**
160	9,81	8,23	0,5
200	9,66	8,77	0,3
250	**10,27**	**8,10**	**0,6**
315	10,18	7,55	0,8
400	9,36	6,50	1,1
500	**9,13**	**6,18**	**1,3**
630	9,81	6,18	1,4
800	9,74	5,85	1,6
1000	**9,69**	**5,55**	**1,9**
1250	8,91	5,12	2,0
1600	7,87	4,54	2,2
2000	**6,86**	**4,05**	**2,4**
2500	5,75	3,49	2,7
3150	4,71	2,97	2,9
4000	**3,81**	**2,53**	**3,1**
5000	2,98	2,10	3,2

f(Hz)	A_{obj} (m²)
125	0,4
250	0,6
500	1,3
1000	1,8
2000	2,4
4000	3,1



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)

Baffle elements with 12 alternating blades 1200x(300/200) mm - made of Slimpanel 9mm - suspension height 500mm

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-10-44141_E

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	0,0	0,0
63	0,0	0,0	0,0	0,0
80	0,0	0,0	0,0	0,0
100	12,44	0,57	10,36	0,52
125	10,03	0,46	8,98	0,44
160	9,81	0,40	8,23	0,37
200	9,66	0,36	8,77	0,34
250	10,27	0,33	8,10	0,29
315	10,18	0,29	7,55	0,25
400	9,36	0,25	6,50	0,21
500	9,13	0,22	6,18	0,18
630	9,81	0,20	6,18	0,16
800	9,74	0,18	5,85	0,14
1000	9,69	0,16	5,55	0,12
1250	8,91	0,14	5,12	0,10
1600	7,87	0,11	4,54	0,09
2000	6,86	0,10	4,05	0,07
2500	5,75	0,08	3,49	0,06
3150	4,71	0,06	2,97	0,05
4000	3,81	0,05	2,53	0,04
5000	2,98	0,04	2,10	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	Aobj (m²)	ε_{Aobj}	δ_{95} (Aobj)
50	0,0	0,0	0,0
63	0,0	0,0	0,0
80	0,0	0,0	0,0
100	0,4	0,1	0,1
125	0,3	0,2	0,1
160	0,5	0,2	0,1
200	0,3	0,1	0,1
250	0,6	0,1	0,1
315	0,8	0,1	0,1
400	1,1	0,1	0,1
500	1,3	0,1	0,1
630	1,4	0,1	0,1
800	1,6	0,1	0,1
1000	1,9	0,1	0,1
1250	2,0	0,1	0,1
1600	2,2	0,1	0,1
2000	2,4	0,1	0,1
2500	2,7	0,1	0,1
3150	2,9	0,2	0,1
4000	3,1	0,2	0,1
5000	3,2	0,2	0,1

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

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

$\delta_{95}(\alpha)$ = 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

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-10-44141_E

ANNEX 2: Description test items by manufacturer

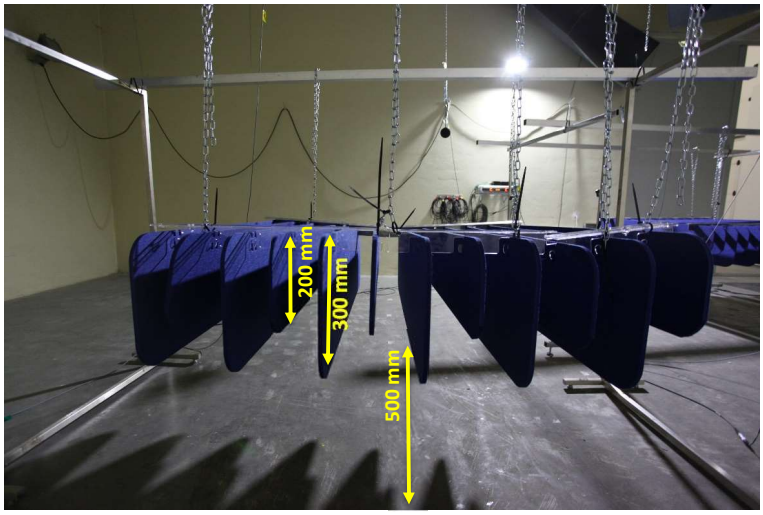
The test sample description given by manufacturer is checked visually as good as possible by the laboratory.
The correspondence between the test element and the commercialized product is the sole responsibility of the manufacturer

Baffle elements with 12 alternating blades 1200x(300/200) mm - made of Slimpanel 9mm - suspension height 500mm

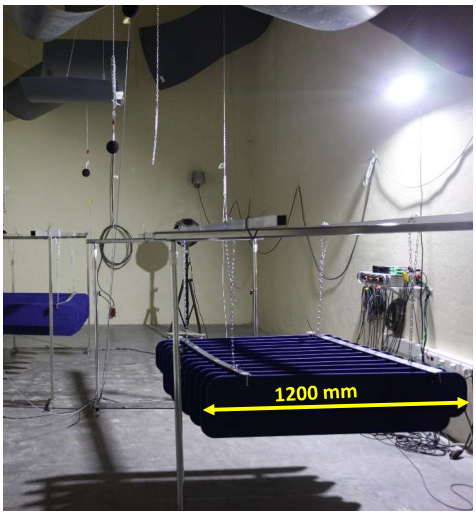
SlimPanel - felt with recycled polyester fibres (PET)
Thickness : 9mm
Mass per unit area : 1900 g/m²

Baffle element with 12 blades: alternating 6 blades of 1200x300mm and 6 bades of 1200x200mm
Distance between the different blades was 90mm
Suspension height : 500mm from the floor of the reverberation room and lower edge of the blades of 300 mm

Product specifications are based on client's declaration



1 object = 1 baffle element with 12 alternating blades of 1200 x (300/200)mm



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

daidalos peutz
laboratory of acoustics

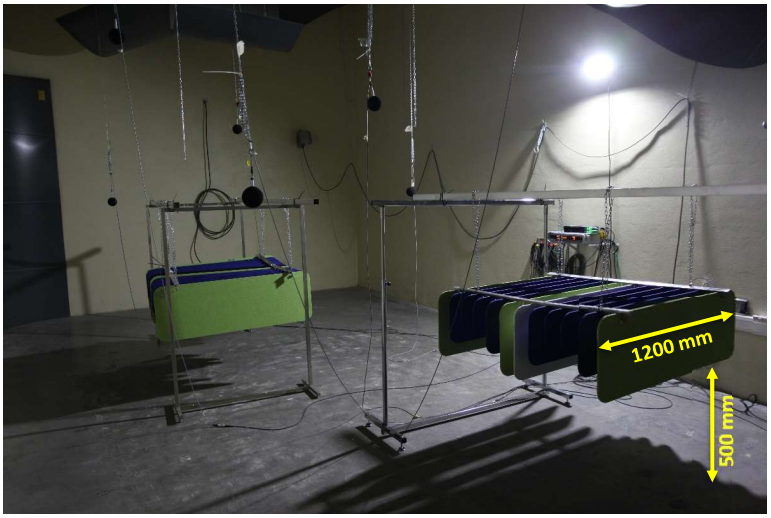
N° 451-TEST
NBN EN ISO 17025:2017
EA MLA signatory

NOISE LAB
REPORT Number A-2020LAB-106-10-44141_E

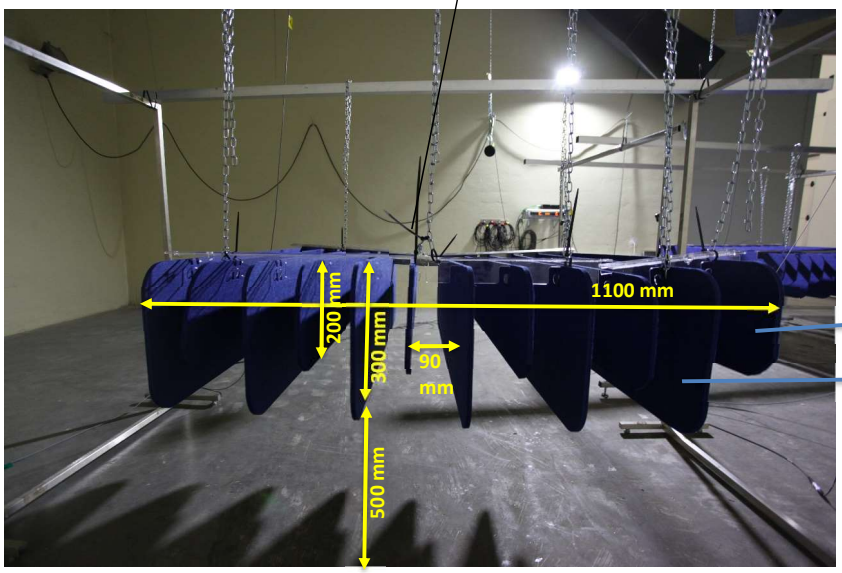
ANNEX 3: Technical datasheet

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



metallic or plastic hanger profile



1 object = 1 baffle element with 12 blades

9mm thickness SlimPanel blade 1200x200mm

9mm thickness SlimPanel blade 1200x300mm

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-10-44141_E

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

Description of the assembly or drawing or photo

Two baffle elements were tested as individual objects, arranged randomly in the reverberation room, spaced at least 2 m apart,
in accordance with the EN ISO 354 standard
In this test one object = 1 baffle element with 12 blades (alternating 1200 x 300/200mm)

Two baffle elements were randomly hung up on a separate frame in the reverberation room.
The baffle elements were mounted 500mm above the room floor using mettalic posts the way that specimen sides wouldn't parallel to the side walls of the room.
Suspension height : 500mm from the floor of the reverberation room and lower edge of the blades of 300mm
Because only 2 individual objects were tested, both were tested on a second location, and the results were averaged

photo : testarrangement with 2 objects on test setup 1

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

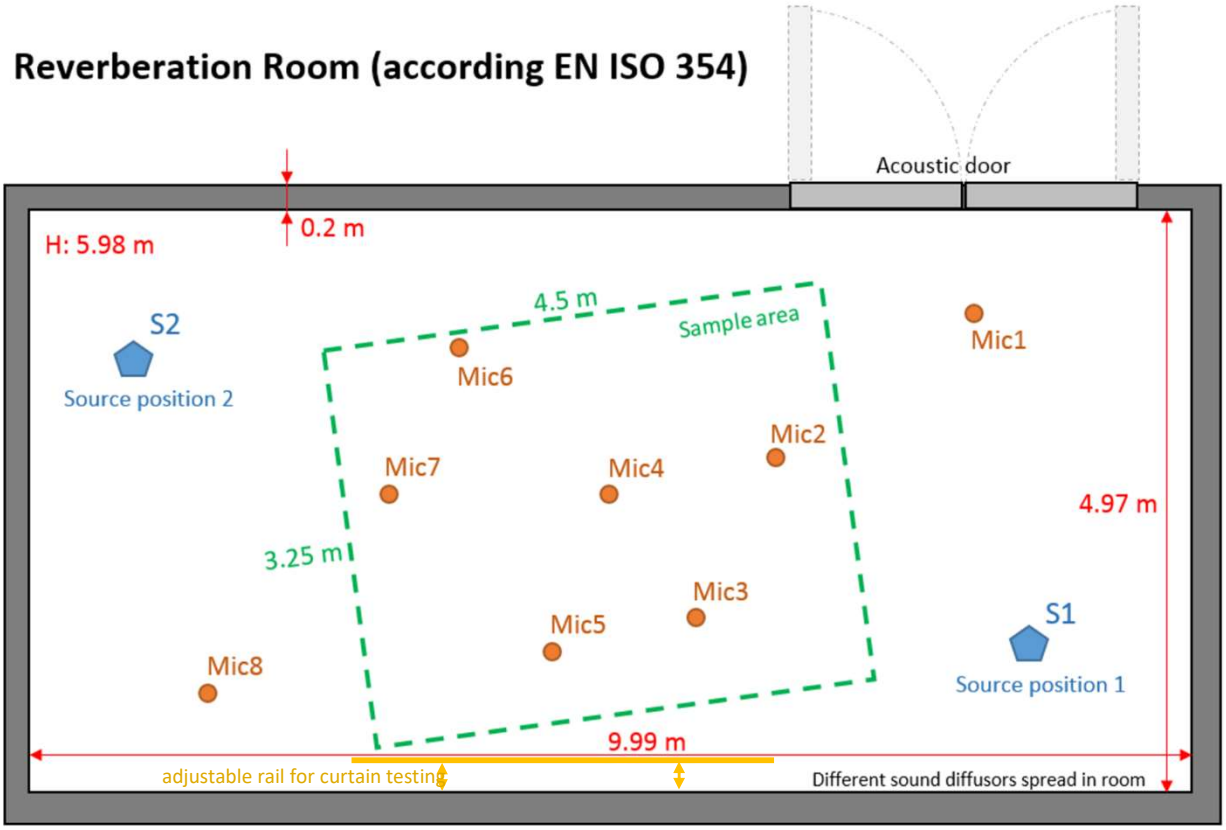
daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-10-44141_E

ANNEX 4: Sketch of the test room

The test room was built and finished according ISO 354.



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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-7-44141_E

Customer :	Texdecor Rue d'Hem, 2 59780 Willems France
Contacts :	**Client :** Julie Truquet **Noise lab :** Els Meulemans
Tests :	Measurement of sound absorption in the reverberation room
Product name :	**Baffle elements with 12 alternating blades 1200 x (300/400)mm - made of Slimpanel 9mm - suspension height 500mı**

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:	7/10/2020	2020LAB-106
Date of receipt of the specimen(s):	5/11/2020	7
Date of construction:	6/11/2020	
Date of tests:	6/11/2020	
Date of preparation of the report:	6/11/2020	

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-7-44141_E

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 :	298,31 m³
	Length:	9,98 m
	Width	4,97 m
	Height	5,99 m
	Volume door niche :	1,32 m³
	Total area:	279,95 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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-7-44141_E

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-7-44141_E

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-7-44141_E

Aobj

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

Identification number of test element: 7 **Test date:** 6/11/2020

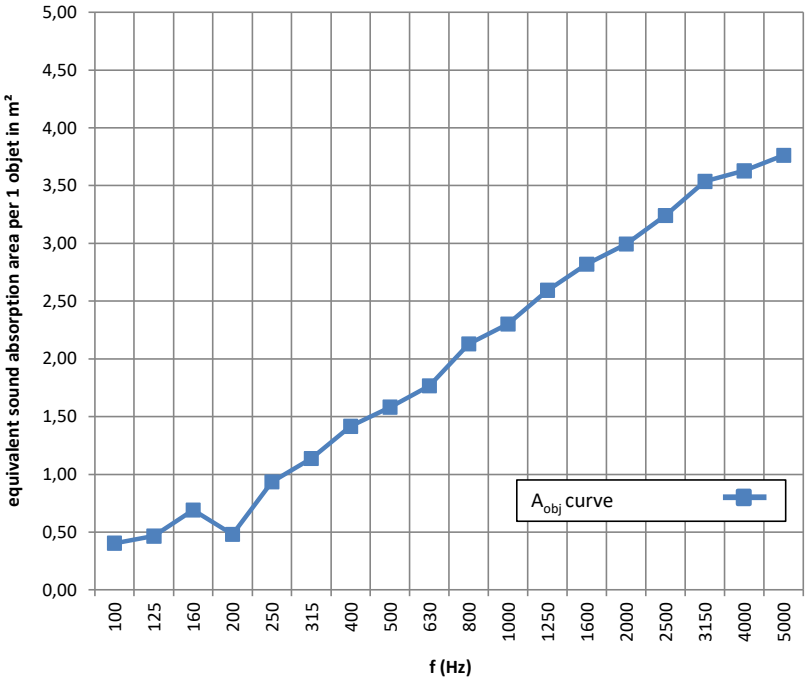
Reverberation room: V = 298,3 m³ S_{tot} = 279,9 m²

Room conditions during measurements:		Empty room	With testelement	
Temperature:	T =	17,5	17,2	°C
Atmospheric pressure:	p =	103,6	102,9	kPa
Relative humidity :	h_r =	64	65	%

Type of test element: **individual object**
Construction characteristics:
* using individual objects
Number of tested objects 2
Number of location setups in the reverberation room 2

f(Hz)	T_1 (s)	T_2 (s)	A_{obj} (m²)
50			
63			
80			
100	12,44	10,30	0,4
125	**10,03**	**8,42**	**0,5**
160	9,81	7,66	0,7
200	9,66	8,11	0,5
250	**10,27**	**7,35**	**0,9**
315	10,18	6,89	1,1
400	9,36	6,05	1,4
500	**9,13**	**5,72**	**1,6**
630	9,81	5,72	1,8
800	9,74	5,24	2,1
1000	**9,69**	**5,04**	**2,3**
1250	8,91	4,56	2,6
1600	7,87	4,10	2,8
2000	**6,86**	**3,71**	**3,0**
2500	5,75	3,24	3,2
3150	4,71	2,79	3,5
4000	**3,81**	**2,42**	**3,6**
5000	2,98	2,03	3,8

f(Hz)	A_{obj} (m²)
125	0,5
250	0,9
500	1,6
1000	2,3
2000	3,0
4000	3,6



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)

Baffle elements with 12 alternating blades 1200 x (300/400)mm - made of Slimpanel 9mm - suspension height 500mm

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-7-44141_E

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	0,0	0,0
63	0,0	0,0	0,0	0,0
80	0,0	0,0	0,0	0,0
100	12,44	0,57	10,30	0,52
125	10,03	0,46	8,42	0,42
160	9,81	0,40	7,66	0,36
200	9,66	0,36	8,11	0,33
250	10,27	0,33	7,35	0,28
315	10,18	0,29	6,89	0,24
400	9,36	0,25	6,05	0,20
500	9,13	0,22	5,72	0,17
630	9,81	0,20	5,72	0,15
800	9,74	0,18	5,24	0,13
1000	9,69	0,16	5,04	0,12
1250	8,91	0,14	4,56	0,10
1600	7,87	0,11	4,10	0,08
2000	6,86	0,10	3,71	0,07
2500	5,75	0,08	3,24	0,06
3150	4,71	0,06	2,79	0,05
4000	3,81	0,05	2,42	0,04
5000	2,98	0,04	2,03	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} (m^2)	ε_{Aobj}	$\delta_{95}(A_{obj})$
50	0,0	0,0	0,0
63	0,0	0,0	0,0
80	0,0	0,0	0,0
100	0,4	0,1	0,1
125	0,5	0,2	0,1
160	0,7	0,2	0,1
200	0,5	0,2	0,1
250	0,9	0,1	0,1
315	1,1	0,1	0,1
400	1,4	0,1	0,1
500	1,6	0,1	0,1
630	1,8	0,1	0,1
800	2,1	0,1	0,1
1000	2,3	0,1	0,1
1250	2,6	0,1	0,1
1600	2,8	0,1	0,1
2000	3,0	0,1	0,1
2500	3,2	0,1	0,1
3150	3,5	0,2	0,1
4000	3,6	0,2	0,1
5000	3,8	0,2	0,1

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

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

$\delta_{95}(A_{obj})$ = 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

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-7-44141_E

ANNEX 2: Description test items by manufacturer

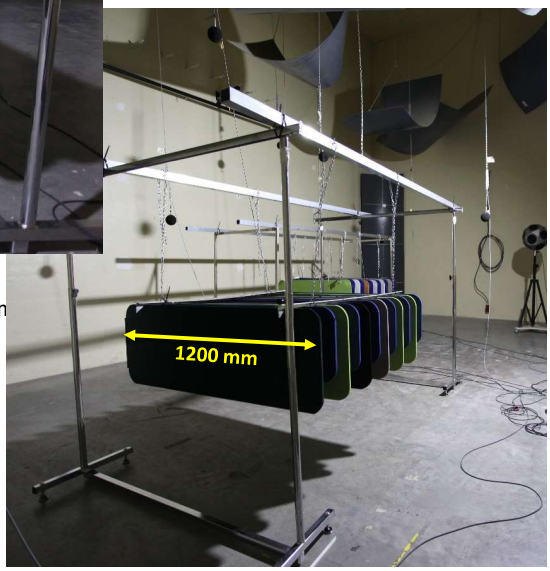
The test sample description given by manufacturer is checked visually as good as possible by the laboratory.
The correspondence between the test element and the commercialized product is the sole responsibility of the manufacturer

Baffle elements with 12 alternating blades 1200 x (300/400)mm - made of Slimpanel 9mm - suspension height 500mm

SlimPanel - felt with recycled polyester fibres (PET)
Thickness : 9mm
Mass per unit area : 1900 g/m²

Baffle element with 12 blades: alternating 6 blades of 1200x300mm and 6 bades of 1200x400mm
Distance between the different blades was 90mm
Suspension height : 500mm from the floor of the reverberation room and lower edge of the blades of 400 mm

Product specifications are based on client's declaration



1 object = 1 baffle element with 12 alternating blades of 1200 x (400/300)mm

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

daidalos peutz
laboratory of acoustics

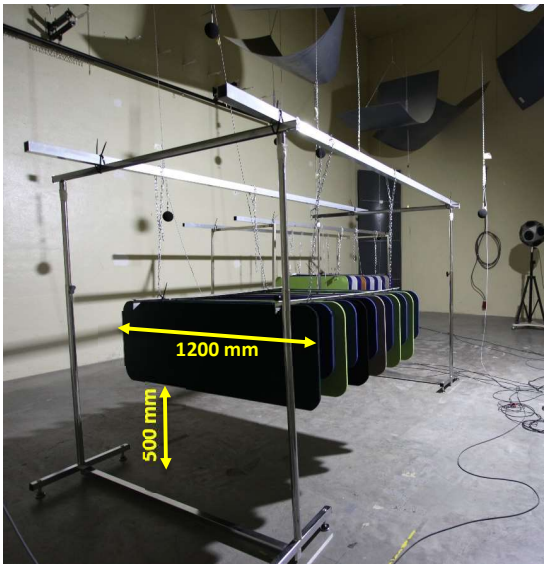
N° 451-TEST
NBN EN ISO 17025:2017
EA MLA signatory

NOISE LAB
REPORT Number A-2020LAB-106-7-44141_E

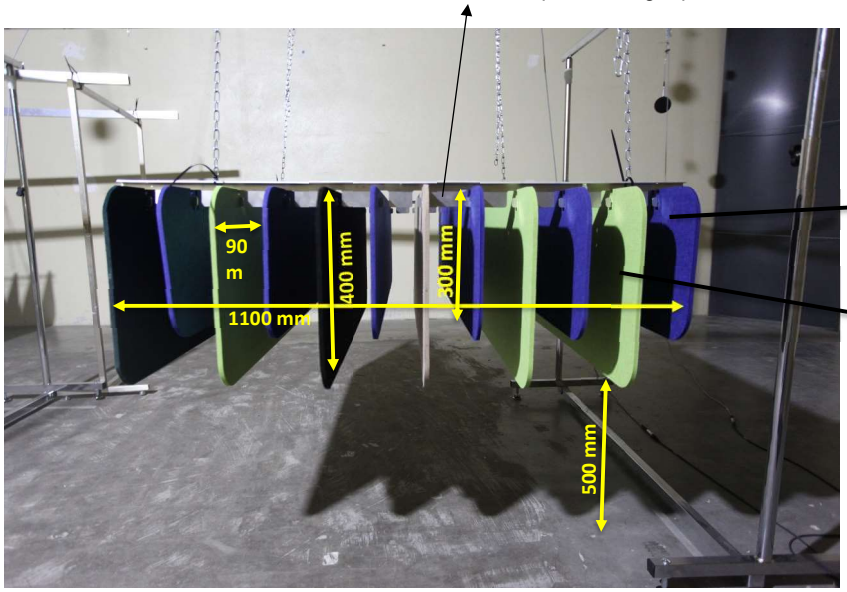
ANNEX 3: Technical datasheet

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



metallic or plastic hanger profile



1 object = 1 baffle element with 12 blades

9mm thickness SlimPanel blade 1200x300mm

9mm thickness SlimPanel blade 1200x400mm

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-7-44141_E

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

Description of the assembly or drawing or photo

Two baffle elements were tested as individual objects, arranged randomly in the reverberation room, spaced at least 2 m apart,
in accordance with the EN ISO 354 standard
In this test one object = 1 baffle element with 12 blades (alternating 1200 x 300/400mm)

Two baffle elements were randomly hung up on a separate frame in the reverberation room.
The baffle elements were mounted 500mm above the room floor using mettalic posts the way that specimen sides wouldn't parallel to the side walls of the room.
Suspension height : 500mm from the floor of the reverberation room and lower edge of the blades of 400mm
Because only 2 individual objects were tested, both were tested on a second location, and the results were averaged

photo : testarrangement with 2 objects on test setup 1

photo : testarrangement with 2 objects on test setup 2

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

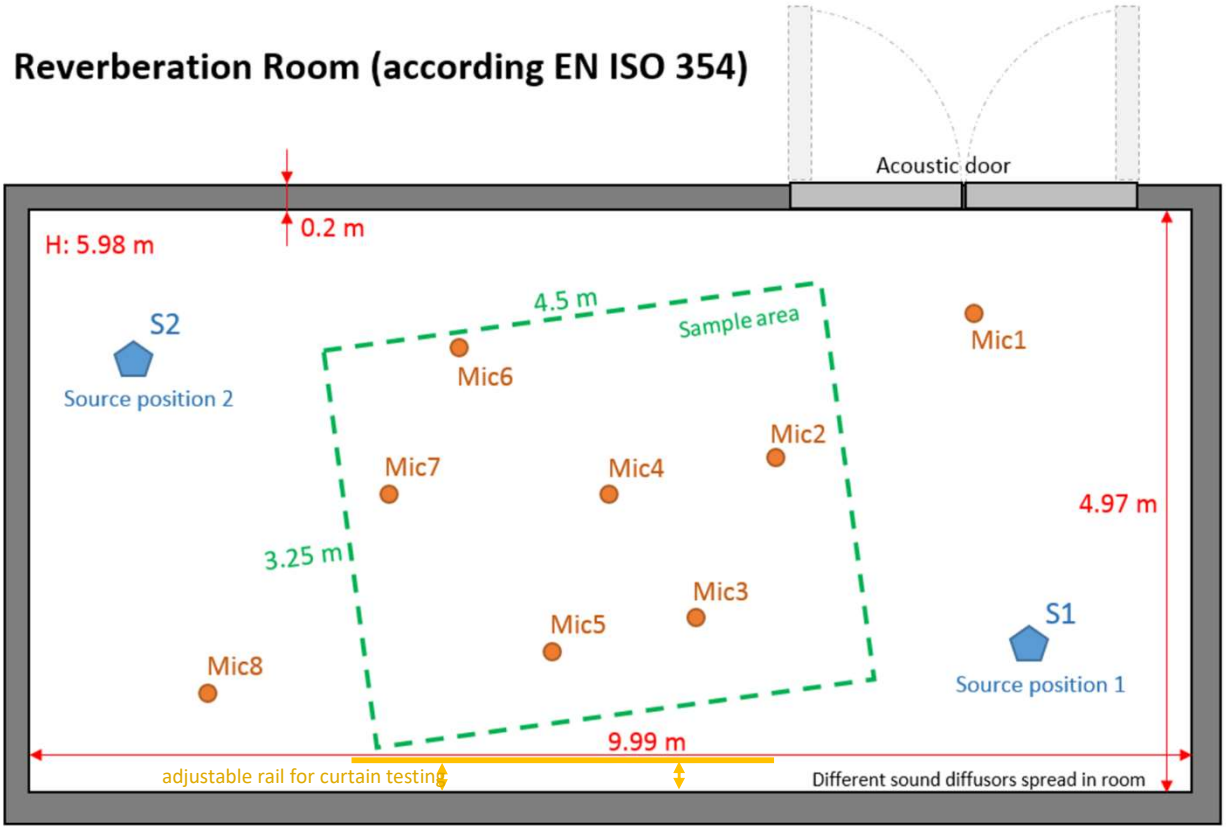
daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-7-44141_E

ANNEX 4: Sketch of the test room

The test room was built and finished according ISO 354.



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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-9-44140_E

Customer :	Texdecor Rue d'Hem, 2 59780 Willems France	
Contacts :	**Client :**	Julie Truquet
	Noise lab :	Els Meulemans
Tests :	Measurement of sound absorption in the reverberation room	
Product name :	**Baffle elements with 12 blades in wave - width 1200 mm - made of Slimpanel 9mm - suspension height 500mm**	

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:	7/10/2020	2020LAB-106
Date of receipt of the specimen(s):	5/11/2020	9
Date of construction:	5/11/2020	
Date of tests:	5/11/2020	
Date of preparation of the report:	6/11/2020	

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-9-44140_E

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 :	298,31 m³
	Length:	9,98 m
	Width	4,97 m
	Height	5,99 m
	Volume door niche :	1,32 m³
	Total area:	279,95 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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-9-44140_E

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-9-44140_E

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-9-44140_E

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

Identification number of test element: **9** **Test date:** 5/11/2020

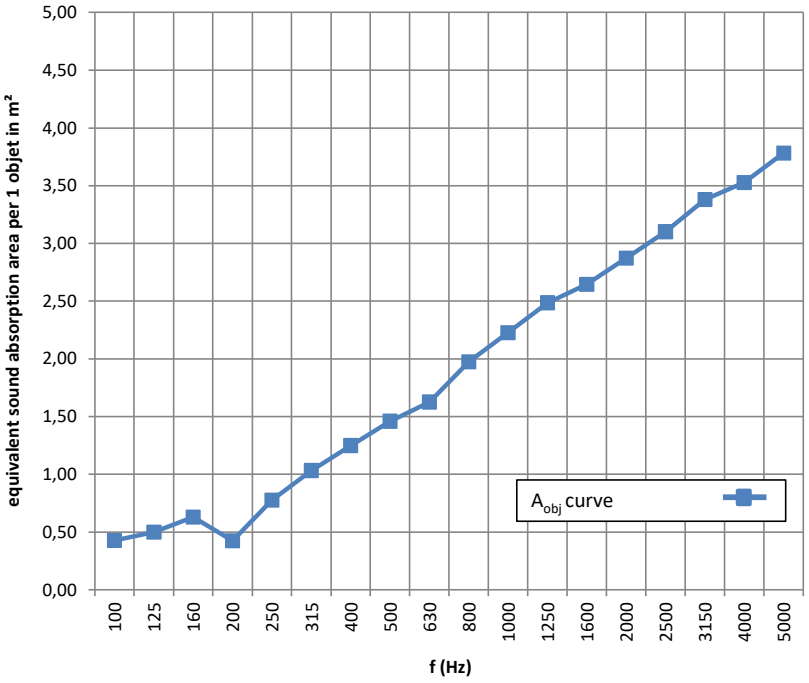
Reverberation room: V = 298,3 m³ S_{tot} = 279,9 m²

Room conditions during measurements:		Empty room	With testelement	
Temperature:	T =	17,5	17,6	°C
Atmospheric pressure:	p =	103,6	103,5	kPa
Relative humidity :	h_r =	64	66	%

Type of test element: **individual object**
Construction characteristics:
* using individual objects
Number of tested objects 2
Number of location setups in the reverberation room 2

f(Hz)	T_1 (s)	T_2 (s)	A_{obj} (m²)
50			
63			
80			
100	12,44	10,20	0,4
125	**10,03**	**8,32**	**0,5**
160	9,81	7,81	0,6
200	9,66	8,27	0,4
250	**10,27**	**7,73**	**0,8**
315	10,18	7,10	1,0
400	9,36	6,31	1,2
500	**9,13**	**5,89**	**1,5**
630	9,81	5,91	1,6
800	9,74	5,43	2,0
1000	**9,69**	**5,12**	**2,2**
1250	8,91	4,66	2,5
1600	7,87	4,24	2,6
2000	**6,86**	**3,79**	**2,9**
2500	5,75	3,33	3,1
3150	4,71	2,86	3,4
4000	**3,81**	**2,47**	**3,5**
5000	2,98	2,06	3,8

f(Hz)	A_{obj} (m²)
125	0,5
250	0,7
500	1,4
1000	2,2
2000	2,9
4000	3,6



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)

Baffle elements with 12 blades in wave - width 1200 mm - made of Slimpanel 9mm - suspension height 500mm

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-9-44140_E

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	0,0	0,0
63	0,0	0,0	0,0	0,0
80	0,0	0,0	0,0	0,0
100	12,44	0,57	10,20	0,52
125	10,03	0,46	8,32	0,42
160	9,81	0,40	7,81	0,36
200	9,66	0,36	8,27	0,33
250	10,27	0,33	7,73	0,29
315	10,18	0,29	7,10	0,24
400	9,36	0,25	6,31	0,20
500	9,13	0,22	5,89	0,18
630	9,81	0,20	5,91	0,16
800	9,74	0,18	5,43	0,13
1000	9,69	0,16	5,12	0,12
1250	8,91	0,14	4,66	0,10
1600	7,87	0,11	4,24	0,08
2000	6,86	0,10	3,79	0,07
2500	5,75	0,08	3,33	0,06
3150	4,71	0,06	2,86	0,05
4000	3,81	0,05	2,47	0,04
5000	2,98	0,04	2,06	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} (m^2)	ε_{Aobj}	$\delta_{95}(A_{obj})$
50	0,0	0,0	0,0
63	0,0	0,0	0,0
80	0,0	0,0	0,0
100	0,4	0,2	0,1
125	0,5	0,2	0,1
160	0,6	0,2	0,1
200	0,4	0,1	0,1
250	0,8	0,1	0,1
315	1,0	0,1	0,1
400	1,2	0,1	0,1
500	1,5	0,1	0,1
630	1,6	0,1	0,1
800	2,0	0,1	0,1
1000	2,2	0,1	0,1
1250	2,5	0,1	0,1
1600	2,6	0,1	0,1
2000	2,9	0,1	0,1
2500	3,1	0,1	0,1
3150	3,4	0,2	0,1
4000	3,5	0,2	0,1
5000	3,8	0,2	0,1

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

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

$\delta_{95}(A_{obj})$ = 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

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-9-44140_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

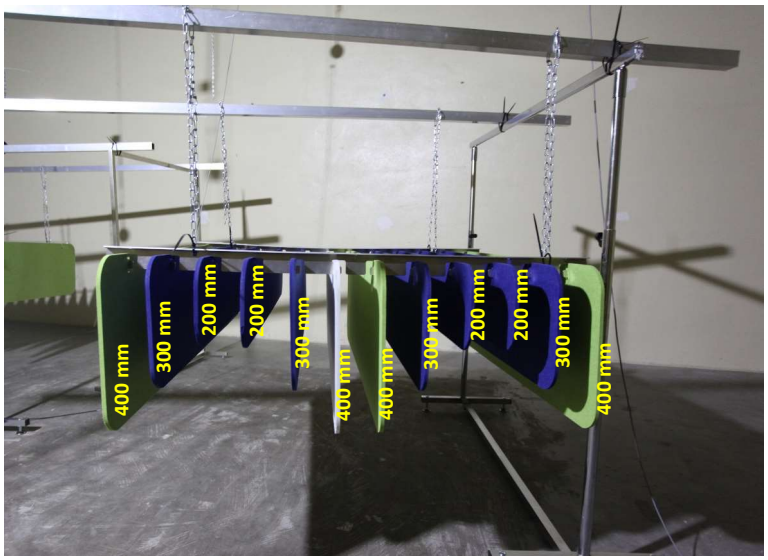
Baffle elements with 12 blades in wave - width 1200 mm - made of Slimpanel 9mm - suspension height 500mm

SlimPanel - felt with recycled polyester fibres (PET)
Thickness : 9mm
Mass per unit area : 1900 g/m²

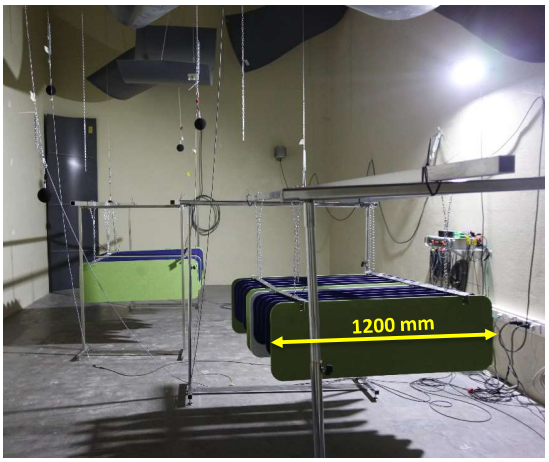
Baffle element with 12 blades in wave form by combining sheets of different height in the following order :
400 - 300 - 200 - 200 - 300 - 400 - 400 - 300 - 200 - 200 - 300 - 400 mm

Distance between the different blades was 90mm
Suspension height : 500mm from the floor of the reverberation room and lower edge of the blades of 400 mm

Product specifications are based on client's declaration



1 object = 1 baffle element with 12 blades in wave form



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

daidalos peutz
laboratory of acoustics

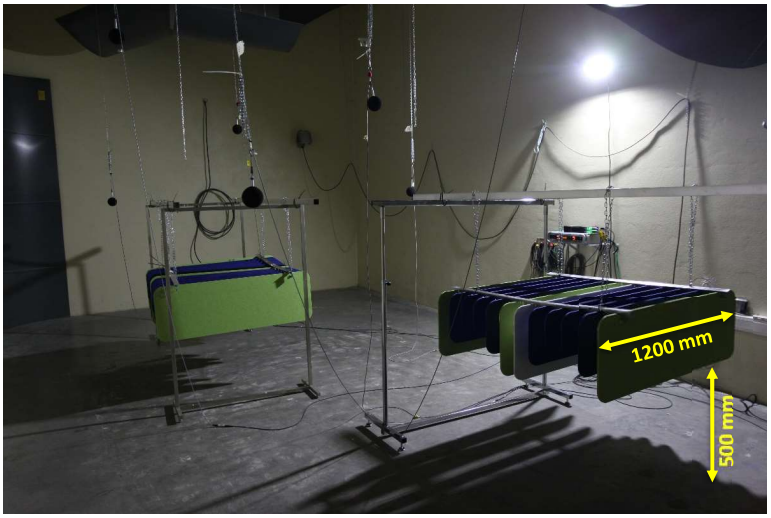
N° 451-TEST
NBN EN ISO 17025:2017
EA MLA signatory

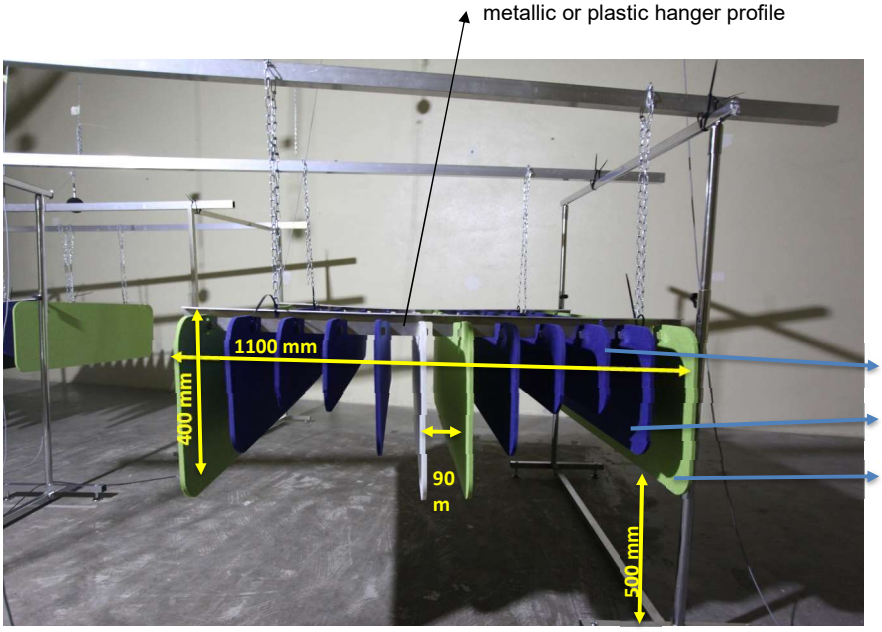
NOISE LAB
REPORT Number A-2020LAB-106-9-44140_E

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





1 object = 1 baffle element with 12 blades

9mm thickness SlimPanel blade 1200x200mm
9mm thickness SlimPanel blade 1200x300mm
9mm thickness SlimPanel blade 1200x400mm

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-9-44140_E

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

Description of the assembly or drawing or photo

Two baffle elements were tested as individual objects, arranged randomly in the reverberation room, spaced at least 2 m apart,
in accordance with the EN ISO 354 standard
In this test one object = 1 baffle element with 12 blades in wave

Two baffle elements were randomly hung up on a separate frame in the reverberation room.
The baffle elements were mounted 500mm above the room floor using mettalic posts the way that specimen sides wouldn't parallel to the side walls of the room.
Suspension height : 500mm from the floor of the reverberation room and lower edge of the blades of 400 mm
Because only 2 individual objects were tested, both were tested on a second location, and the results were averaged

photo : testarrangement with 2 objects on test setup 1

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

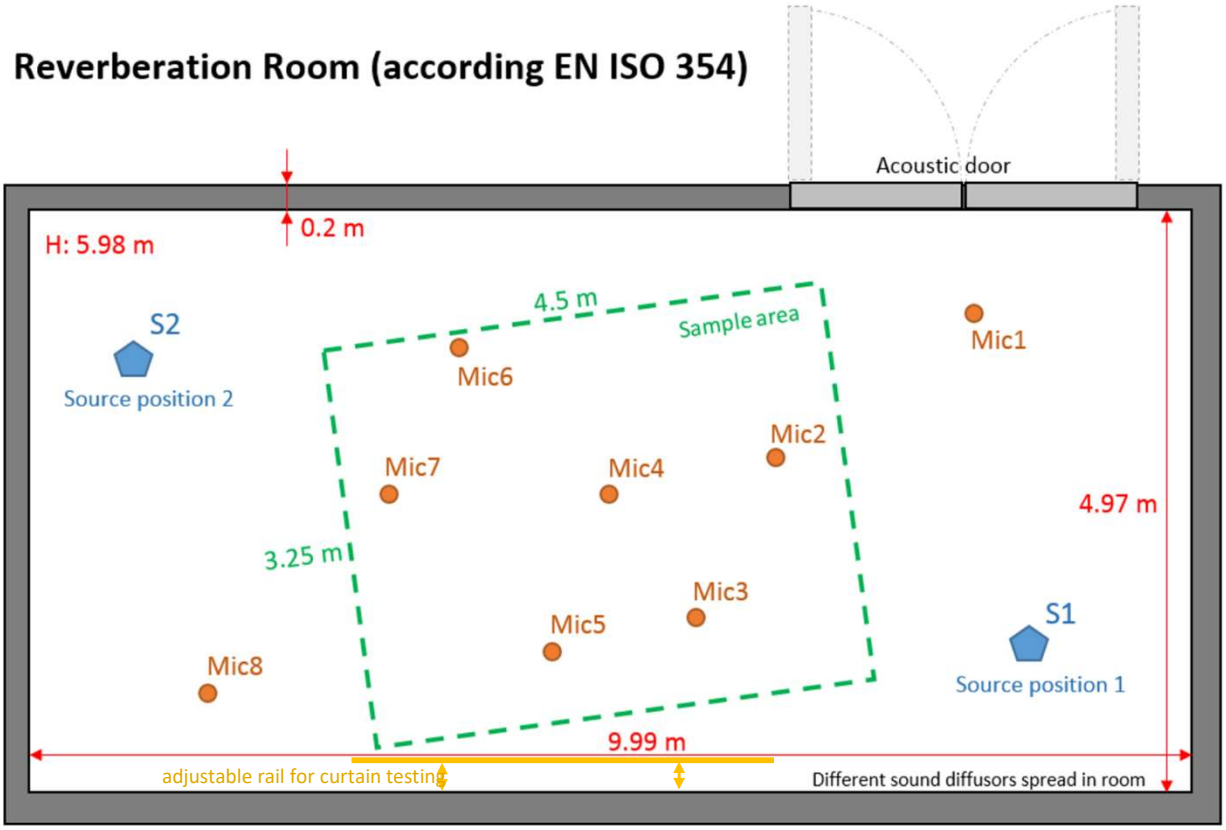
daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-106-9-44140_E

ANNEX 4: Sketch of the test room

The test room was built and finished according ISO 354.



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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-05-44028_E

Customer :	Texdecor Rue d'Hem, 2 59780 Willems France	
Contacts :	**Client :**	Julie Truquet
	Noise lab :	Els Meulemans
Tests :	Measurement of sound absorption in the reverberation room	
Product name :	**Baffle elements with 12 trapezium blades 1200x(150/300) - made of Slimpanel 9mm - suspension height 500mm**	

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:	21/02/2020	2020LAB-011
Date of receipt of the specimen(s):	16/07/2020	05
Date of construction:	16/07/2020	
Date of tests:	16/07/2020	
Date of preparation of the report:	6/11/2020	

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-05-44028_E

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 :	298,31 m³
	Length:	9,98 m
	Width	4,97 m
	Height	5,99 m
	Volume door niche :	1,32 m³
	Total area:	279,95 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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-05-44028_E

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):

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

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

-
-
-
-
-

n/a

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-05-44028_E

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-05-44028_E

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

Identification number of test element: **05** **Test date:** 16/07/2020

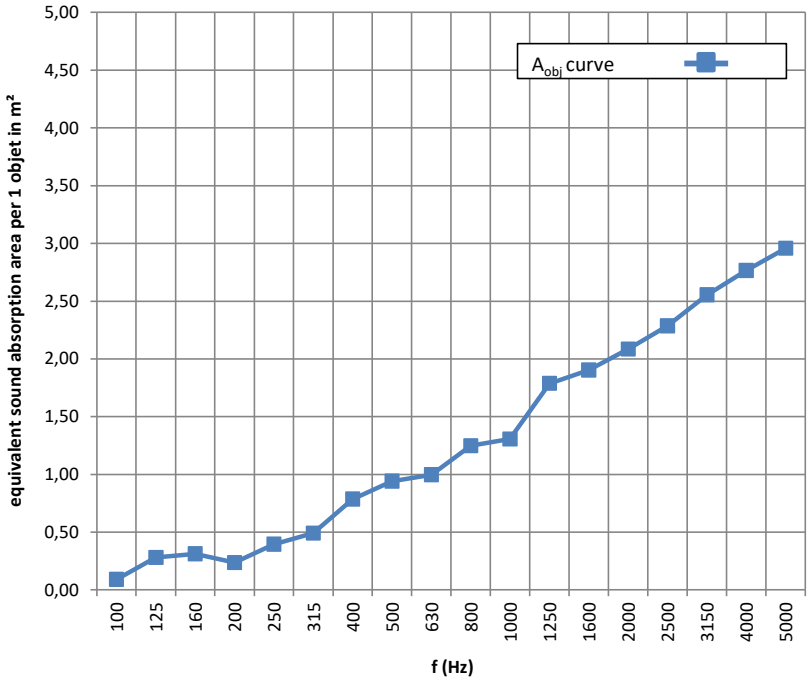
Reverberation room: V = 298,3 m³ S_{tot} = 279,9 m²

Room conditions during measurements:		Empty room	With testelement	
Temperature:	T =	21,0	21,0	°C
Atmospheric pressure:	p =	101,5	101,6	kPa
Relative humidity :	h_r =	69	69	%

Type of test element: **individual object**
Construction characteristics:
* using individual objects
Number of tested objects 2
Number of location setups in the reverberation room 2

f(Hz)	T_1 (s)	T_2 (s)	A_{obj} (m²)
50			
63			
80			
100	10,93	10,50	0,1
125	**9,62**	**8,65**	**0,3**
160	9,43	8,40	0,3
200	9,92	9,04	0,2
250	**9,88**	**8,50**	**0,4**
315	9,51	7,96	0,5
400	8,89	6,89	0,8
500	**8,87**	**6,58**	**0,9**
630	9,08	6,60	1,0
800	9,02	6,15	1,2
1000	**8,84**	**5,97**	**1,3**
1250	8,30	5,13	1,8
1600	7,51	4,71	1,9
2000	**6,66**	**4,22**	**2,1**
2500	5,75	3,72	2,3
3150	4,89	3,22	2,6
4000	**4,08**	**2,78**	**2,8**
5000	3,24	2,32	3,0

f(Hz)	A_{obj} (m²)
125	0,2
250	0,4
500	0,9
1000	1,4
2000	2,1
4000	2,8



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)

Baffle elements with 12 trapezium blades 1200x(150/300) - made of Slimpanel 9mm - suspension height 500mm

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-05-44028_E

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	0,0	0,0
63	0,0	0,0	0,0	0,0
80	0,0	0,0	0,0	0,0
100	10,93	0,54	10,50	0,53
125	9,62	0,45	8,65	0,43
160	9,43	0,39	8,40	0,37
200	9,92	0,36	9,04	0,35
250	9,88	0,32	8,50	0,30
315	9,51	0,28	7,96	0,26
400	8,89	0,24	6,89	0,21
500	8,87	0,22	6,58	0,19
630	9,08	0,20	6,60	0,17
800	9,02	0,17	6,15	0,14
1000	8,84	0,15	5,97	0,13
1250	8,30	0,13	5,13	0,10
1600	7,51	0,11	4,71	0,09
2000	6,66	0,09	4,22	0,07
2500	5,75	0,08	3,72	0,06
3150	4,89	0,06	3,22	0,05
4000	4,08	0,05	2,78	0,04
5000	3,24	0,04	2,32	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	A_{obj} (m^2)	ε_{Aobj}	$\delta_{95}(A_{obj})$
50	0,0	0,0	0,0
63	0,0	0,0	0,0
80	0,0	0,0	0,0
100	0,1	0,2	0,1
125	0,3	0,2	0,1
160	0,3	0,2	0,1
200	0,2	0,1	0,1
250	0,4	0,1	0,1
315	0,5	0,1	0,1
400	0,8	0,1	0,1
500	0,9	0,1	0,1
630	1,0	0,1	0,1
800	1,2	0,1	0,1
1000	1,3	0,1	0,0
1250	1,8	0,1	0,1
1600	1,9	0,1	0,1
2000	2,1	0,1	0,1
2500	2,3	0,1	0,1
3150	2,6	0,1	0,1
4000	2,8	0,2	0,1
5000	3,0	0,2	0,1

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

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

$\delta_{95}(A_{obj})$ = 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

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-05-44028_E

ANNEX 2: Description test items by manufacturer

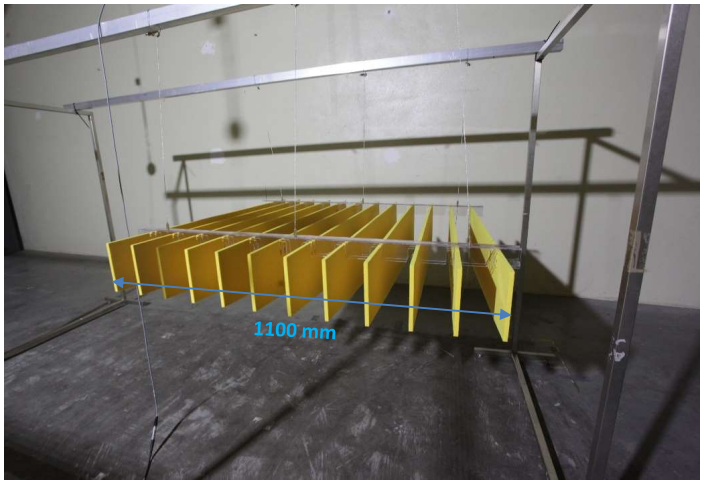
The test sample description given by manufacturer is checked visually as good as possible by the laboratory.
The correspondence between the test element and the commercialized product is the sole responsibility of the manufacturer

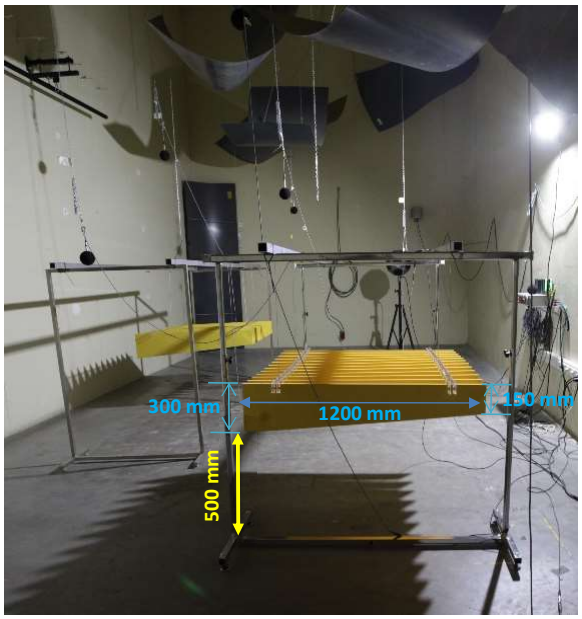
Baffle elements with 12 trapezium blades 1200x(150/300) - made of Slimpanel 9mm - suspension height 500mm

SlimPanel - felt with recycled polyester fibres (PET)
Thickness : 9mm
Mass per unit area : 1900 g/m²

Baffle element with 12 trapezium blades of 1200 x (150/300) mm
Distance between the different blades was 90mm
Suspension height : 500mm from the floor of the reverberation room and lower edge of the trapezium blades

Product specifications are based on client's declaration





1 object = 1 baffle element with 12 trapezium blades of 1200x(150/300) mm

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

daidalos peutz
laboratory of acoustics

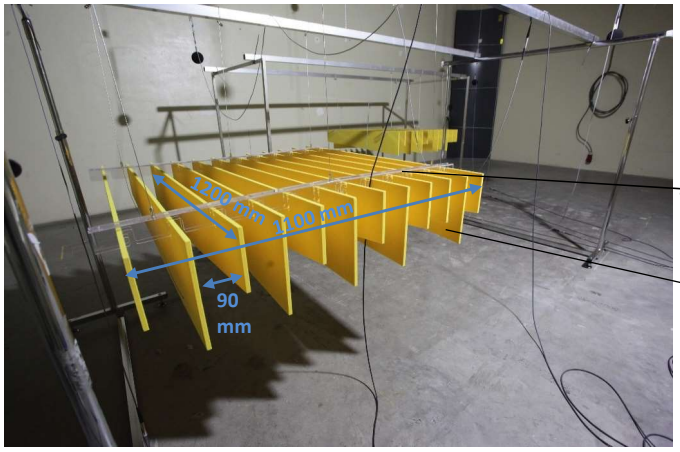
N° 451-TEST
NBN EN ISO 17025:2017
EA MLA signatory

NOISE LAB
REPORT Number A-2020LAB-011-05-44028_E

ANNEX 3: Technical datasheet

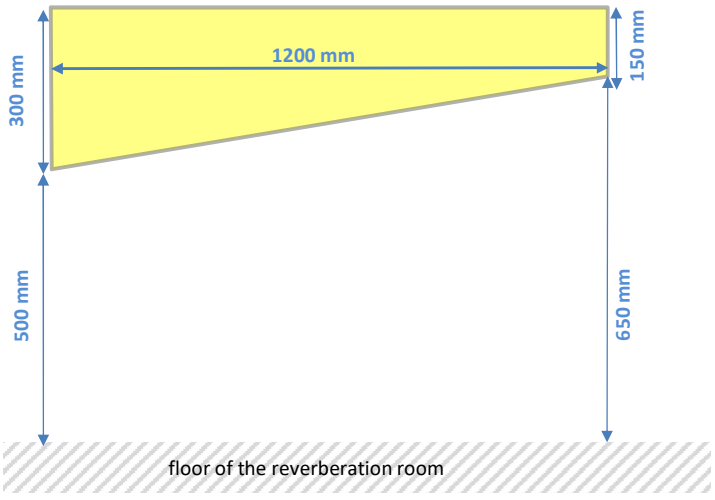
The test sample description given by manufacturer is checked visually as good as possible by the laboratory.
The correspondence between the test element and the commercialized product is the sole responsibility of the manufacturer

Please request at supplier



plastic hanger profile

9mm thickness SlimPanel trapezium blade 1200x(150/300)mm



1 object = 1 baffle element with 12 trapezium blades

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-05-44028_E

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

Description of the assembly or drawing or photo

Two baffle elements were tested as individual objects, arranged randomly in the reverberation room, spaced at least 2 m apart,
in accordance with the EN ISO 354 standard
In this test one object = 1 baffle element with 12 trapezium blades of 1200 x (150/300) mm

Two baffle elements were randomly hung up on a separate frame in the reverberation room.
The baffle elements were mounted 500mm above the room floor using mettalic posts the way that specimen sides wouldn't parallel to the side walls of the room.
Suspension height : 500mm from the floor of the reverberation room and lower edge of the trapezium blades

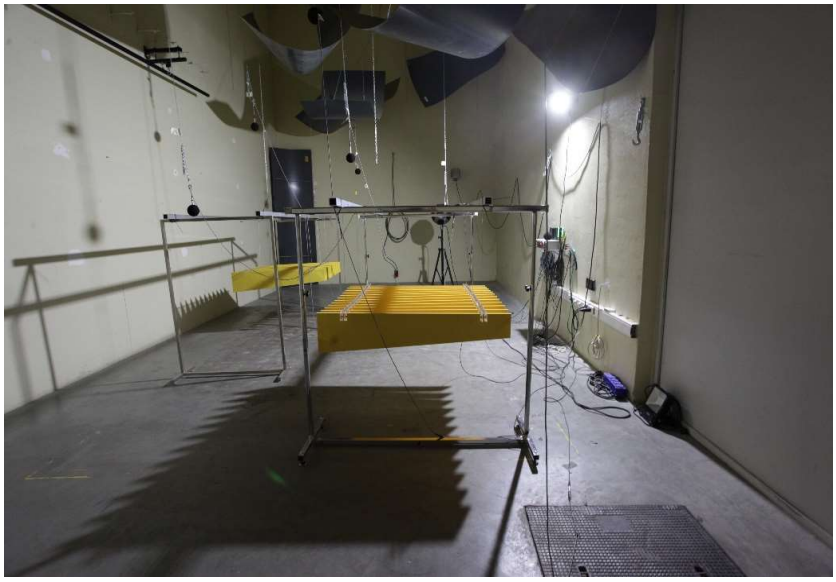
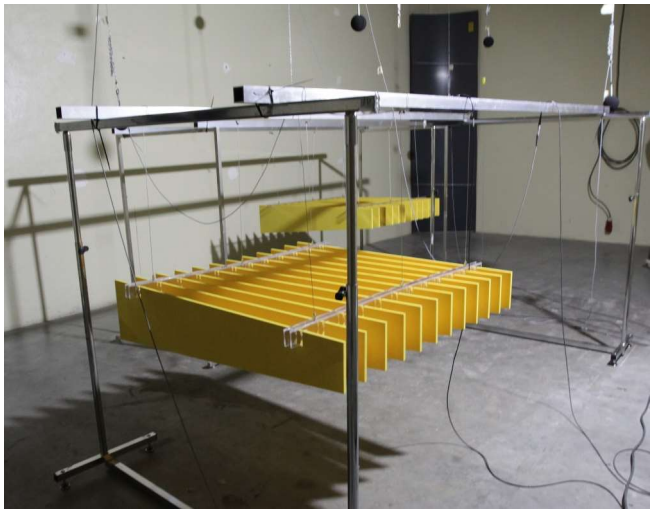


photo : testarrangement with 2 objects on test setup 1



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

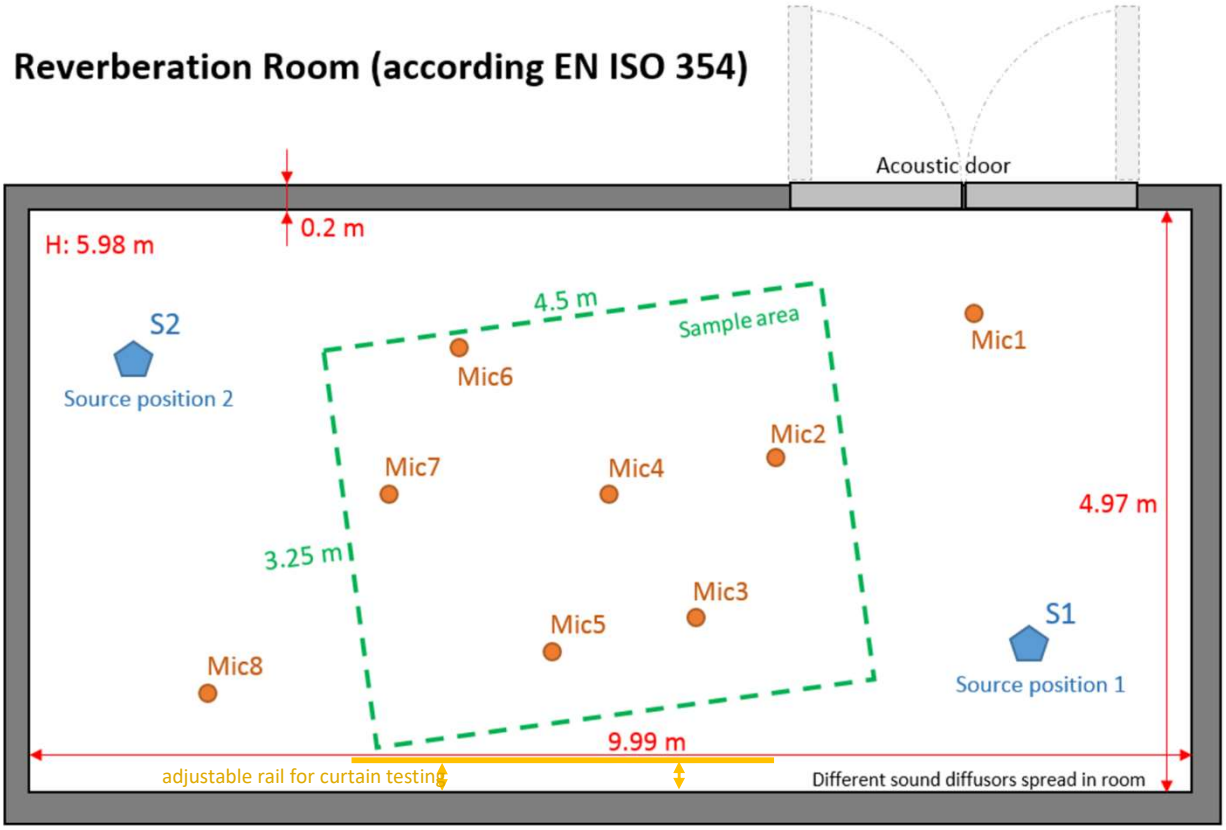
daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-05-44028_E

ANNEX 4: Sketch of the test room

The test room was built and finished according ISO 354.



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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-04-44028_E

Customer :	Texdecor Rue d'Hem, 2 59780 Willems France	
Contacts :	**Client :**	Julie Truquet
	Noise lab :	Els Meulemans
Tests :	Measurement of sound absorption in the reverberation room	
Product name :	**Baffle elements of 12 alternating trapezium blades 1200x(150/300) - made of Slimpanel 9mm - suspension height 500mm**	

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:	21/02/2020	2020LAB-011
Date of receipt of the specimen(s):	16/07/2020	04
Date of construction:	16/07/2020	
Date of tests:	16/07/2020	
Date of preparation of the report:	6/11/2020	

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-04-44028_E

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 :	298,31 m³
	Length:	9,98 m
	Width	4,97 m
	Height	5,99 m
	Volume door niche :	1,32 m³
	Total area:	279,95 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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-04-44028_E

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):

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

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

-
-
-
-
-

n/a

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-04-44028_E

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-04-44028_E

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

Identification number of test element: **04** **Test date:** 16/07/2020

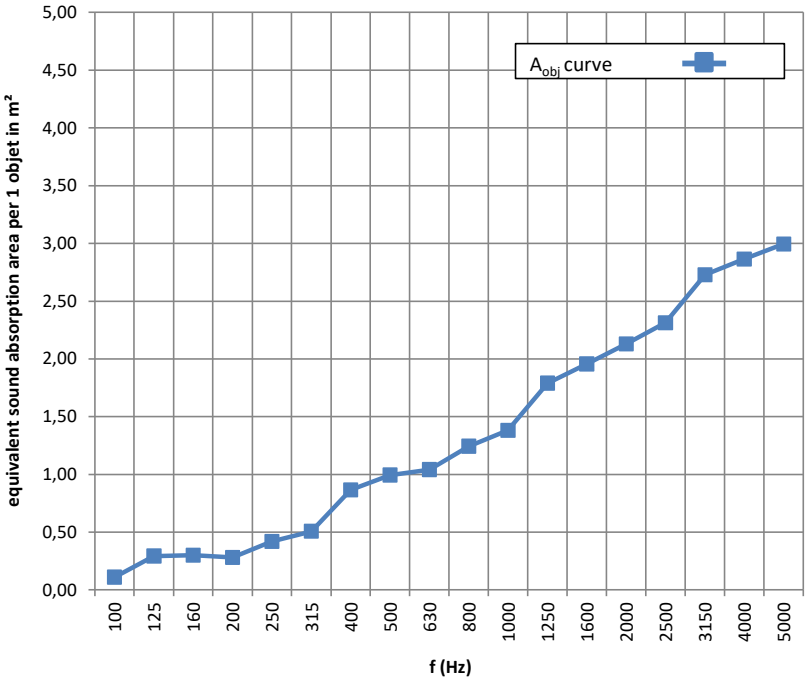
Reverberation room: V = 298,3 m³ S_{tot} = 279,9 m²

Room conditions during measurements:		Empty room	With testelement	
Temperature:	T =	21,0	21,0	°C
Atmospheric pressure:	p =	101,5	101,6	kPa
Relative humidity :	h_r =	69	69	%

Type of test element: **individual object**
Construction characteristics:
* using individual objects
Number of tested objects 2
Number of location setups in the reverberation room 2

f(Hz)	T_1 (s)	T_2 (s)	A_{obj} (m²)
50			
63			
80			
100	10,93	10,41	0,1
125	**9,62**	**8,61**	**0,3**
160	9,43	8,43	0,3
200	9,92	8,89	0,3
250	**9,88**	**8,43**	**0,4**
315	9,51	7,92	0,5
400	8,89	6,74	0,9
500	**8,87**	**6,49**	**1,0**
630	9,08	6,52	1,0
800	9,02	6,15	1,2
1000	**8,84**	**5,86**	**1,4**
1250	8,30	5,13	1,8
1600	7,51	4,66	2,0
2000	**6,66**	**4,19**	**2,1**
2500	5,75	3,70	2,3
3150	4,89	3,15	2,7
4000	**4,08**	**2,75**	**2,9**
5000	3,24	2,31	3,0

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



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)

Baffle elements of 12 alternating trapezium blades 1200x(150/300) - made of Slimpanel 9mm - suspension height 500mm

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-04-44028_E

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	0,0	0,0
63	0,0	0,0	0,0	0,0
80	0,0	0,0	0,0	0,0
100	10,93	0,54	10,41	0,52
125	9,62	0,45	8,61	0,43
160	9,43	0,39	8,43	0,37
200	9,92	0,36	8,89	0,34
250	9,88	0,32	8,43	0,30
315	9,51	0,28	7,92	0,26
400	8,89	0,24	6,74	0,21
500	8,87	0,22	6,49	0,19
630	9,08	0,20	6,52	0,17
800	9,02	0,17	6,15	0,14
1000	8,84	0,15	5,86	0,12
1250	8,30	0,13	5,13	0,10
1600	7,51	0,11	4,66	0,09
2000	6,66	0,09	4,19	0,07
2500	5,75	0,08	3,70	0,06
3150	4,89	0,06	3,15	0,05
4000	4,08	0,05	2,75	0,04
5000	3,24	0,04	2,31	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} (m^2)	ε_{Aobj}	$\delta_{95}(A_{obj})$
50	0,0	0,0	0,0
63	0,0	0,0	0,0
80	0,0	0,0	0,0
100	0,1	0,2	0,1
125	0,3	0,2	0,1
160	0,3	0,2	0,1
200	0,3	0,1	0,1
250	0,4	0,1	0,1
315	0,5	0,1	0,1
400	0,9	0,1	0,1
500	1,0	0,1	0,1
630	1,0	0,1	0,1
800	1,2	0,1	0,1
1000	1,4	0,1	0,0
1250	1,8	0,1	0,1
1600	2,0	0,1	0,1
2000	2,1	0,1	0,1
2500	2,3	0,1	0,1
3150	2,7	0,1	0,1
4000	2,9	0,2	0,1
5000	3,0	0,2	0,1

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

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

$\delta_{95}(A_{obj})$ = 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

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

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-04-44028_E

ANNEX 2: Description test items by manufacturer

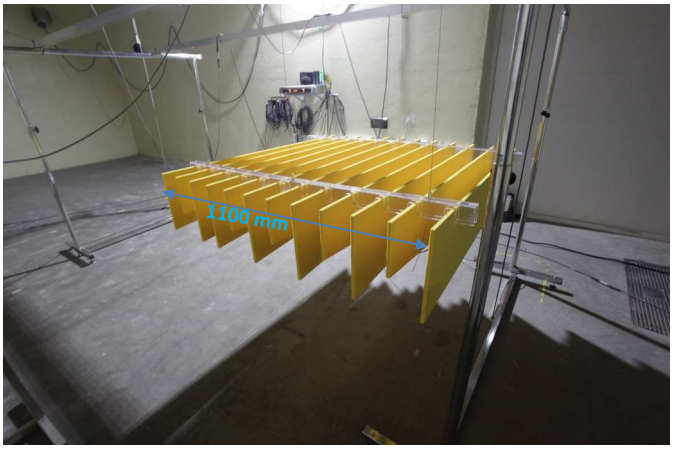
The test sample description given by manufacturer is checked visually as good as possible by the laboratory.
The correspondence between the test element and the commercialized product is the sole responsibility of the manufacturer

Baffle elements of 12 alternating trapezium blades 1200x(150/300) - made of Slimpanel 9mm - suspension height 500mm

SlimPanel - felt with recycled polyester fibres (PET)
Thickness : 9mm
Mass per unit area : 1900 g/m²

Baffle element with 12 trapezium blades of 1200 x (150/300) mm
Distance between the different blades was 90mm
Suspension height : 500mm from the floor of the reverberation room and lower edge of the blades

Product specifications are based on client's declaration



1 object = 1 baffle element with 12 alternating trapezium blades of 1200x(150/300) mm

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

daidalos peutz
laboratory of acoustics

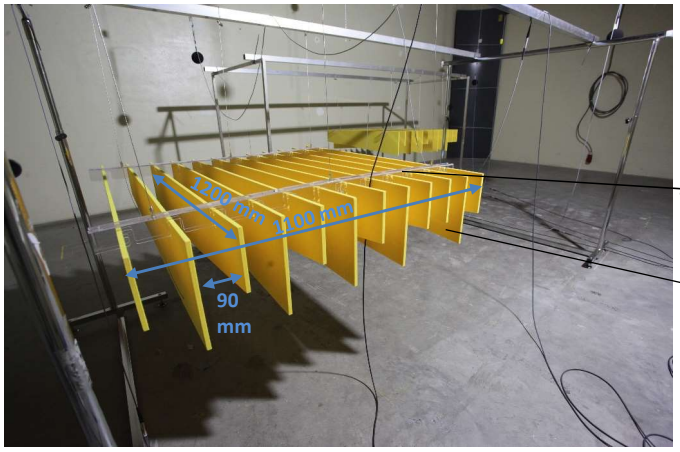
N° 451-TEST
NBN EN ISO 17025:2017
EA MLA signatory

NOISE LAB
REPORT Number A-2020LAB-011-04-44028_E

ANNEX 3: Technical datasheet

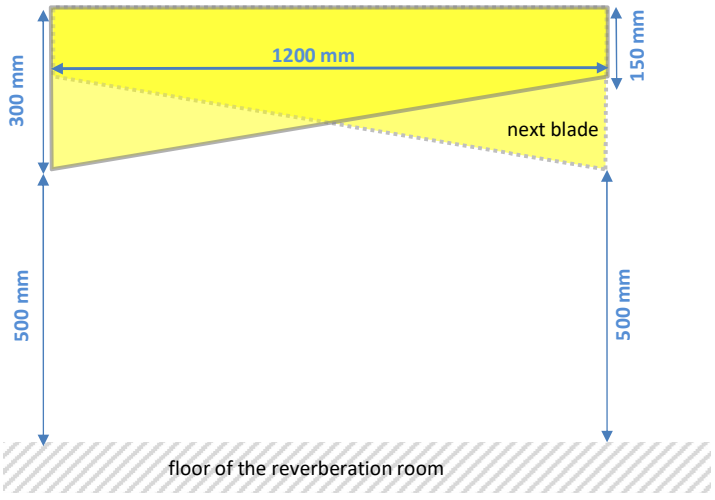
The test sample description given by manufacturer is checked visually as good as possible by the laboratory.
The correspondence between the test element and the commercialized product is the sole responsibility of the manufacturer

Please request at supplier



plastic hanger profile

9mm thickness SlimPanel trapezium blade 1200x(150/300)mm



1 object = 1 baffle element with 12 trapezium blades

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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-04-44028_E

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

Description of the assembly or drawing or photo

Two baffle elements were tested as individual objects, arranged randomly in the reverberation room, spaced at least 2 m apart,
in accordance with the EN ISO 354 standard
In this test one object = 1 baffle element with 12 trapezium blades of 1200 x (150/300) mm

Two baffle elements were randomly hung up on a separate frame in the reverberation room.
The baffle elements were mounted 500mm above the room floor using mettalic posts the way that specimen sides wouldn't parallel to the side walls of the room.
Suspension height : 500mm from the floor of the reverberation room and lower edge of the trapezium blades

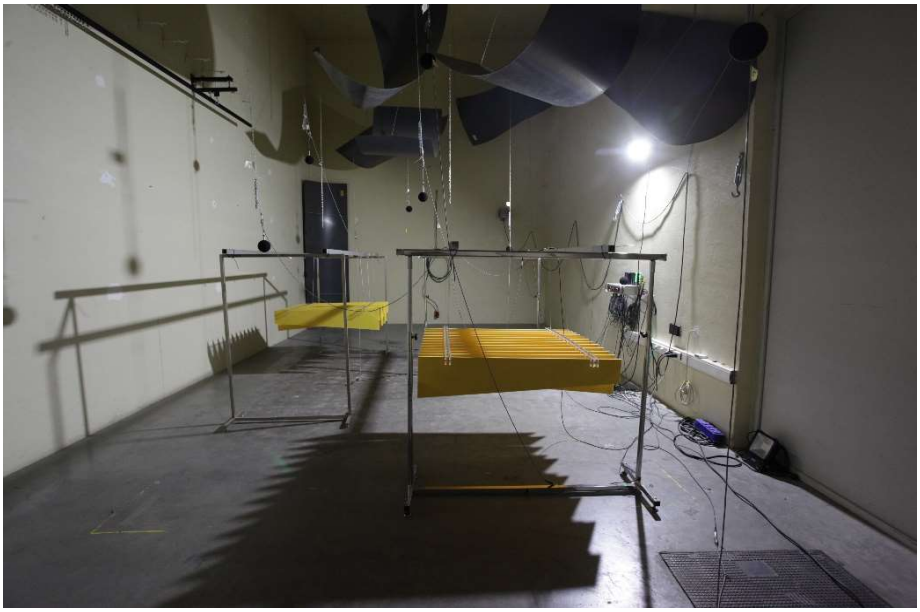
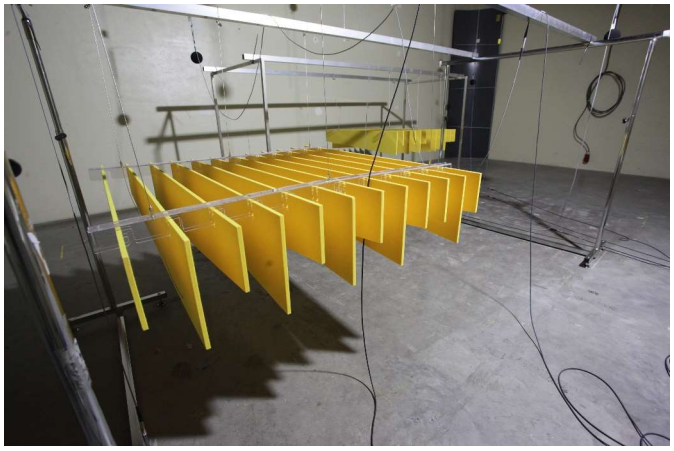


photo : testarrangement with 2 objects on test setup 1



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

daidalos peutz
laboratory of acoustics

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

NOISE LAB
REPORT Number A-2020LAB-011-04-44028_E

ANNEX 4: Sketch of the test room

The test room was built and finished according ISO 354.