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daidalos peutz
laboratory of acoustics

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

NOISE LAB
TEST REPORT Number A-2024LAB-020-1-2-45398_E

Customer :	Texdecor Rue d'Hem, 2 59780 Willems France
Contacts :	Client : Max Olivier Loubert Noise lab : Gert-Jan Loobuyck
Tests :	Measurement of sound absorption in the reverberation room
Product / series name :	**Acoustic wall covering - Collection Polyform Vinacoustic Roma**

Reference norm :	
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:	21/02/2024		2024LAB-020
Date of receipt of the specimen (s):	14/04/2024		1-2
Date of construction:	16/04/2024	until	16/04/2024
Date of tests:	16/04/2024	until	16/04/2024
Date of preparation of the test report:	16/04/2024		

The measurements were carried out at Daidalos Peutz Laboratory for Acoustics at Hooglede, see appendix 1
This test report together with its annexes contains 10 pages and must be multiplied only in its entirety.

Technical Manager,

Paul Mees

Laboratory Engineer,

Els Meulemans

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MEASURING EQUIPMENT

Sound Sources
Brüel & Kjaer - 4292 : Omni Power Sound Source (+ Behringer iNuke NU3000DSP power amplifier)

Microphones and recording
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
A PC with all necessary software

Reverberation room
Dimensions of the room:	Volume :	298,31 m³
	Length:	9,99 m
	Width:	4,97 m
	Height:	5,98 m
	Volume door opening:	1,32 m³
	Total area:	279,9 m²

l_{max} = 12,65 m < 1,9 $V^{1/3}$

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

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TEST METHOD

The tests were conducted in accordance with the provisions of the test method EN ISO354:2003. A detailed description of the test set up can be found in the standard.
The measurement method can be simply descibed as follows:

The reverberation time of the room is determined in 2 situations:
- an empty reflecting room
- a reflecting room with the test sample inside, which is mounted following the different prescriptions specified in the standard

By adding the test sample inside the room, the reverberation time will be shorter. The reduction of reverberation time is a reference for the amount of added absorption.

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

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

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

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

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

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

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

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

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

whereas:

A_2,A_1	=	*the equivalent sound absorption area of respectively the empty reverberation room and the room containing a test specimen [m²]*
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,T_2	=	*the reverberation time, in seconds, of the empty reverberation room resp. with test specimen in [s]*
m_1,m_2	=	*the power attenuation coefficient, in reciprocal metres, calculated according to ISO 9613-1:1993*
A_T	=	*The equivalent sound absorption area of the test specimen in square metres*
S	=	*the area, in square metres, covered by the test specimen*
α_s	=	*the sound absorption coefficient*

SPECIAL MEASUREMENT CONDITIONS

-
-
-
-
-

n/a

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RATING OF SOUND ABSORPTION

α_p PRACTICAL SOUND ABSORPTION COEFFICIENT

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

α_w WEIGHTED SOUND ABSORPTION COEFFICIENT

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

SHAPE INDICATORS, L,M,H

Whenever a practical sound absorption coefficient api exceeds the value of the shifted reference curve by 0,25 or more, one or more shape indicators shall be added, in parantheses, to the aw value.

If the excess absorption occurs at 250 Hz, use the notation L.
If the excess absorption occurs at 500 Hz or 1000 Hz, use the notation M.
If the excess absorption occurs at 2000 Hz or 4000 Hz, use the notation H.

NRC NOISE REDUCTION COEFFICIENT

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

SAA SOUND ABSORPTION AVERAGE

NRC is being replaced by the Sound Absorption Average (SAA), which is described in the current ASTM C423-17. The SAA is a single-number rating of sound absorption properties of a material similar to NRC, except that the sound absorption values employed in the averaging are taken at the twelve one-third octave bands from 200 Hz to 2500 Hz, inclusive, and rounding is to the nearest multiple of 0.01.

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

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

ACCURACY

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

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

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

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

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

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1. α_s SOUND ABSORPTION COEFFICIENT

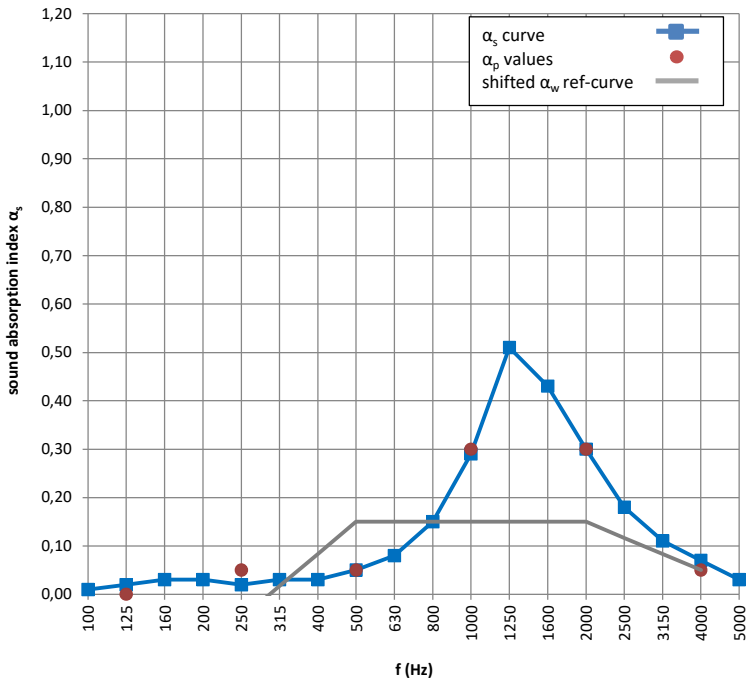
EN ISO 354:2003	Acoustics - Measurement of sound absorption in a reverberation room
EN ISO 11654:1997	Acoustics - Sound absorbers for use in buildings - Rating of sound absorption
ISO 12999-2:2020	Acoustics - Determination and application of measurement uncertainties in building acoustics - Part 2: Sound absorption

Identification number of test element: 1 **Test date:** 16/04/2024
Name of test institute : Daidalos Peutz Laboratory of Acoustics, Hooglede, Belgium
Reverberation room: V = 298,3 m³ S_{tot} = 279,9 m²

Room conditions during measurements:		Empty space	With testelement	
Temperature:	T =	17,8	17,5	°C
Atmospheric pressure:	p =	100,42	100,5	kPa
Relative humidity :	h_r =	62,3	61,9	%

Type of test element: **Plane absorber**
Construction characteristics:
Mounting type in line with ISO354 Annex B: Type A mounting (directly against a room surface)
Area of test element: 10,94 m²
Total thickness: 1,5 à 3,5 mm
Number of layers,including air spaces: 1
Connection of layers: Multiple bands of the wall covering were loosely laid next to each other, directly on the floor of the reverberation room. No adhesive was used.

f(Hz)	T_1 (s)	T_2 (s)	α_s	±U (k=2)
50				
63				
80				
100	10,09	9,88	0,01	±0,03
125	**8,22**	**7,90**	**0,02**	±0,04
160	8,94	8,49	0,03	±0,04
200	9,50	9,01	0,03	±0,04
250	**9,05**	**8,68**	**0,02**	±0,03
315	9,34	8,72	0,03	±0,03
400	8,58	8,05	0,03	±0,03
500	**8,41**	**7,71**	**0,05**	±0,04
630	8,68	7,51	0,08	±0,04
800	8,49	6,60	0,15	±0,04
1000	**8,61**	**5,50**	**0,29**	±0,05
1250	8,09	4,17	0,51	±0,07
1600	7,13	4,20	0,43	±0,06
2000	**6,24**	**4,37**	**0,30**	±0,05
2500	5,32	4,37	0,18	±0,04
3150	4,40	3,94	0,11	±0,04
4000	**3,42**	**3,22**	**0,07**	±0,03
5000	2,73	2,66	0,03	±0,03



f(Hz)	α_p	±U (k=2)
125	0,00	
250	0,05	± 0,04
500	0,05	± 0,08
1000	0,30	± 0,08
2000	0,30	± 0,08
4000	0,05	± 0,10

α_w = 0,15 * **± 0,07 (k=2)**
Sound absorption class: E

NRC = 0,2 **
SAA = 0,18 **

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

Requested by: Texdecor,Rue d'Hem, 2,59780 Willems

TESTELEMENT:
(short description by the manufacturer, details: see Annex 1)

Acoustic wall covering (Collection Polyform Vinacoustic Roma) on concrete base, without adhesives

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2. α_s SOUND ABSORPTION COEFFICIENT

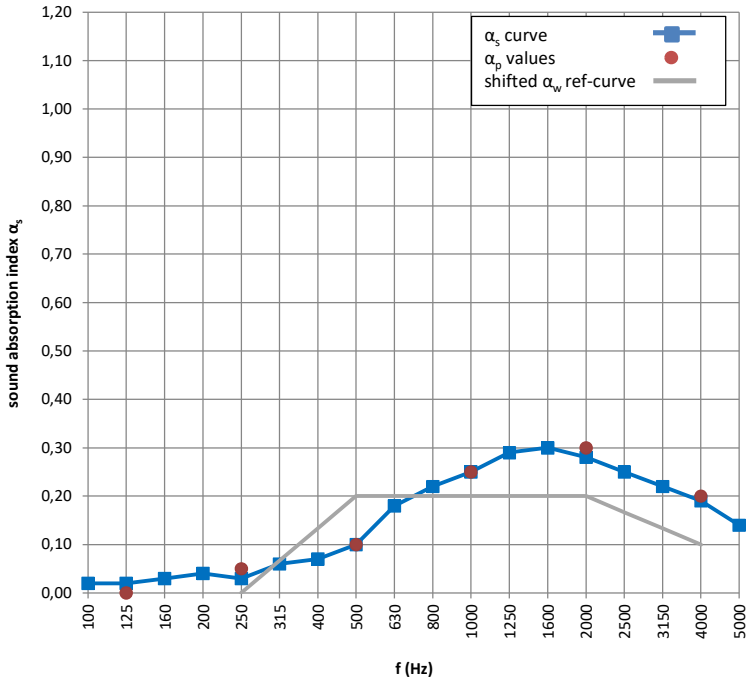
EN ISO 354:2003	Acoustics - Measurement of sound absorption in a reverberation room
EN ISO 11654:1997	Acoustics - Sound absorbers for use in buildings - Rating of sound absorption
ISO 12999-2:2020	Acoustics - Determination and application of measurement uncertainties in building acoustics - Part 2: Sound absorption

Identification number of test element: **2** **Test date:** 16/04/2024
Name of test institute : Daidalos Peutz Laboratory of Acoustics, Hoogledе, Belgium
Reverberation room: V = 298,3 m³ S_{tot} = 279,9 m²

Room conditions during measurements:		Empty space	With testelement	
Temperature:	T =	17,8	17,5	°C
Atmospheric pressure:	p =	100,42	100,6	kPa
Relative humidity :	h_r =	62,3	62,2	%

Type of test element: **Plane absorber**
Construction characteristics:
Mounting type in line with ISO354 Annex B: Type B mounting (glued directly to a hard surface)
Area of test element: 10,90 m²
Total thickness: 12,5 + (1,5 à 3,5) mm
Number of layers,including air spaces: 2
Connection of layers: The wall covering is tested according to the requirements of ISO 354:2003 "Type B-mounting" The covering is glued on a plasterboard with Metylan Ovalit TM and the whole is placed loosly on the floor of the reverberation room.

f(Hz)	T_1 (s)	T_2 (s)	α_s	±U (k=2)
50				
63				
80				
100	10,09	9,72	0,02	±0,04
125	**8,22**	**7,92**	**0,02**	±0,04
160	8,94	8,44	0,03	±0,04
200	9,50	8,79	0,04	±0,04
250	**9,05**	**8,47**	**0,03**	±0,04
315	9,34	8,33	0,06	±0,04
400	8,58	7,54	0,07	±0,04
500	**8,41**	**7,01**	**0,10**	±0,04
630	8,68	6,43	0,18	±0,05
800	8,49	5,94	0,22	±0,05
1000	**8,61**	**5,76**	**0,25**	±0,05
1250	8,09	5,30	0,29	±0,05
1600	7,13	4,81	0,30	±0,05
2000	**6,24**	**4,46**	**0,28**	±0,05
2500	5,32	4,06	0,25	±0,05
3150	4,40	3,61	0,22	±0,04
4000	**3,42**	**2,96**	**0,19**	±0,04
5000	2,73	2,50	0,14	±0,04



f(Hz)	α_p	±U (k=2)
125	0,00	
250	0,05	± 0,04
500	0,10	± 0,08
1000	0,25	± 0,08
2000	0,30	± 0,08
4000	0,20	± 0,10

α_w = 0,20 * **± 0,07 (k=2)**
Sound absorption class: E

NRC =	0,2 **
SAA =	0,17 **

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

Requested by: Texdecor,Rue d'Hem, 2,59780 Willems

TESTELEMENT:
(short description by the manufacturer, details: see Annex 1)

Acoustic wall covering (Collection Polyform Vinacoustic Roma) bonded to BA13 plasterboard, with Ovalit

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ANNEX 1: Description test items by manufacturer

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

Acoustic wall covering : Polyform Vanacoustic Syracuse Roma
Manufacturer: Texdecor
Type : Acoustic wall covering
Collection Polyform Vanacoustic Roma
Composition: Vinyl on acoustic fleece
Roll size: 125 cm wide / 25 lm
Thickness: 1,5 mm à 3,5 mm depending on area

The acoustic wall covering was tested in 2 setups:
test 1 : directly on the floor of the measurement room
test 2: glued on a BA13 plasterboard, thickness 12,5mm. Total height of the test setup: 12,5 mm + (1,5 à 3,5 mm)

photo : front detail of the acoustic wall cladding

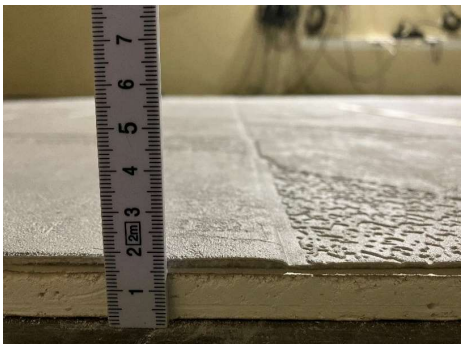

photo: cross-section of the acoustic wall clading after bonding to BA13 plasterboard for test 2

photo: glue wall-mounted textile

photo: during bonding the wall covering on the plasterboard

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ANNEX 2: Technical datasheets

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

Further information can be obtained from the manufacturer

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ANNEX 3: Photographs of the test elements and/or the test arrangements

Description of the assembly and/or drawing and/or image

The acoustic wall covering was tested in 2 setups:

Test 1 : directly on the floor of the measurement room

The sample was installed as a type A mounting according to Annex B of the standard ISO 354:2003.
Multiple bands of the wall covering were loosely laid next to each other, directly on the floor of the reverberation room. No adhesive was used.
The joints between the bands were covered with a non sound absorbing tape.
To prevent the side edges from absorbing sound, the perimeter of the sample was covered with a non sound absorbing tape.
The sample measure 3,645 m x 3,000 m, surface 10,94 m²

Test 2: glued on a BA13 plasterboard

The sample was installed as a type B mounting according to Annex B of the standard ISO 354:2003.
Beforehand, the wall covering was glued to the gypsum boards with Ovalit adhesive.
Multiple gypsum boards with the wall covering were laid side by side and were placed loosely directly on the floor of the reverberation room.
The joints between the gypsumboards with the covering were covered with a non sound absorbing tape.
To prevent the side edges, the perimeter of the sample was covered with tape.
The sample measure 3,640 m x 2,995 m, surface 10,9 m²

Test 1 : directly on the floor of the measurement room

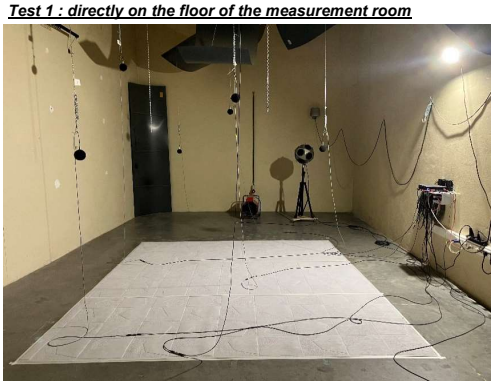

photo: total test setup of test 1

photo : detail of the joints between the multiple bands of the wall covering and the side edges, covered with a non sound absorbing tape

Test 2: glued on a BA13 plasterboard

photo: total test setup of test 2

photo : detail of the joints between the multiple bands of the wall covering and the side edges, covered with a non sound absorbing tape

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ANNEX 4: Sketch of the test room

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The test room was built and finnished according ISO 354.