CENTRUM TECHNIKI OKRĘTOWEJ S.A.

Maritime Advanced Research Centre

AB 1241

RESEARCH AND DEVELOPMENT DEPARTMENT

ENVIRONMENTAL LABORATORIES DIVISION

VIBROACOUSTIC TESTS LABORATORY

NOTIFIED BODY
NB 2434

TEST REPORT

No. RS-2023/B-025/E

Evaluation of sound absorption coefficient of
LAMELIO wall panels from Gaudiahome s.r.o.

Adresess:
ul. Szczecińska 65
80-392 Gdańsk

tel.: 58 511 62 28
e-mail: rs@cto.gda.pl

Issue date: 15.02.2023

Contents

1. Basic data

Table 1. Summary of data and test parameters

Customer: Gaudiahome s.r.o., Vysokoskolakov 8421/41, 01008 Zilina, Slovakia	**Order:** e-mail from 27.12.2022 **CTO S.A. order number**: 8.441.05.223	
	Delivery date of test object: 28.12.2022 **Date and place of measurements:** Gdańsk, 03.01.2023 Maritime Advanced Research Centre Environmental Laboratories Division Vibroacoustic Tests Laboratory	
Name and type of test object: LAMELIO wall panels made of polystyrene by *Gaudiahome s.r.o*	**Method and analysis according to:** • Standard *PN-EN ISO 354:2005* • Standard *PN-EN ISO 11654:1999*	
Manufacturer: Gaudiahome s.r.o., Vysokoskolakov 8421/41, 01008 Zilina, Slovakia	Conditions:	
	Relative humidity	Table 4
Designation of the test object in CTO S.A.: LA1895	Temperature	Table 4
	Atmospheric pressure	Table 4

Measuring equipment:	**Channel 1**	**Channel 2**
measuring wires	0SvankK3	1SvankK3
microphone	Norsonic 1225 Nr ser. 284627	Norsonic 1225 Nr ser. 285516
preamplifier	Norsonic 1209 Nr ser. 21138	Norsonic 1209 Nr ser. 21137
sound analyzer	Norsonic Nor 140 nr ser. 1406930	Norsonic Nor 140 nr ser. 1406929
calibrator	Larson Davis, typ CAL200, nr 11524	
sound source	Larson Davis BAS001 nr seryjny 1225-DIC08	
thermo-hygro-barometer	typ LB-706BP, nr 846 typ LB-701, nr 3605	
measuring tape	RS/0003	

Sound absorption results:

Measured value	Actual value
α_w – sound absorption coefficient	**Tab. 4**

Graph of sound absorption as a function of frequency and other relevant information is presented in a form compatible with the PN-EN ISO 354:2005 in **chapter 5**.

Note: Presented values are valid only for the tested object.

Note 2: Technical description of tested object has been made according to data provided by the Customer.

2. Test method

Measurement of sound absorption was performed in reverberation chamber with a volume of 200 m^3 in the Maritime Advanced and Research Centre, in Vibrocoustic Tests Laboratory. Chamber specifications are placed in APPENDIX No. 1. Reverberation chamber was tuned to achieve reverberation time required by the PN-EN ISO 354:2005. This was achieved by setting up 3 attenuator-diffusers and 8 diffusers. Their sound absorption area complies with Table 2.

Table 2. Equivalent sound absorption areas for a 200 m^3 reverberation chamber for sound absorption coefficient measurements

Frequency, Hz	100	125	160	200	250	315	400	500	630	800
A_1, m^2 - Value measured in laboratory	4,2	4,0	4,6	4,8	5,5	5,6	5,6	5,6	5,8	5,9
A_1 Max value acc. to norm	6,5	6,5	6,5	6,5	6,5	6,5	6,5	6,5	6,5	6,5

Frequency, Hz	1000	1250	1600	2000	2500	3150	4000	5000
A_1, m^2 - Value measured in laboratory	6,1	6,3	6,7	7,1	8,0	9,4	11,1	13,6
A_1 Max value acc. to norm	7,0	7,5	8,0	9,5	10,5	12,0	13,0	14,0

Measurements were conducted for 12 *microphone-sound source* positions. Measurement in each position was repeated 3 times, in accordance with requirements in PN-EN ISO 354:2005. Test object was mounted directly on the floor of reverberation chamber, at a minimum distance of 1000 mm from the wall.

Test was carried out using sound analyzer *Nor 140* by Norsonic and analysis was performed in *Nor 850 – Building Acoustics* application. Measurements were performed using methods in accordance with norm PN-EN ISO 354:2005 *Acoustics — Measurement of sound absorption in a reverberation room*. Ratings α_P and α_W according to standard PN-EN ISO 11654:1999 *Acoustics — Sound absorbers for use in buildings — Rating of sound absorption.*

3. Description of the test object

Description has been declared by the Customer. Dimensions and description is presented on APPENDIX 2.

The photos of tested objects No. LA1895 in Laboratory's reverberation chamber are presented in fig. 1-2.

Fig. 1. A photo of tested object No. LA1895 in Laboratory's reverberation chamber

The diagram of the measuring chamber K3 in the Vibroacoustic Research Laboratory is shown in Figure 2.

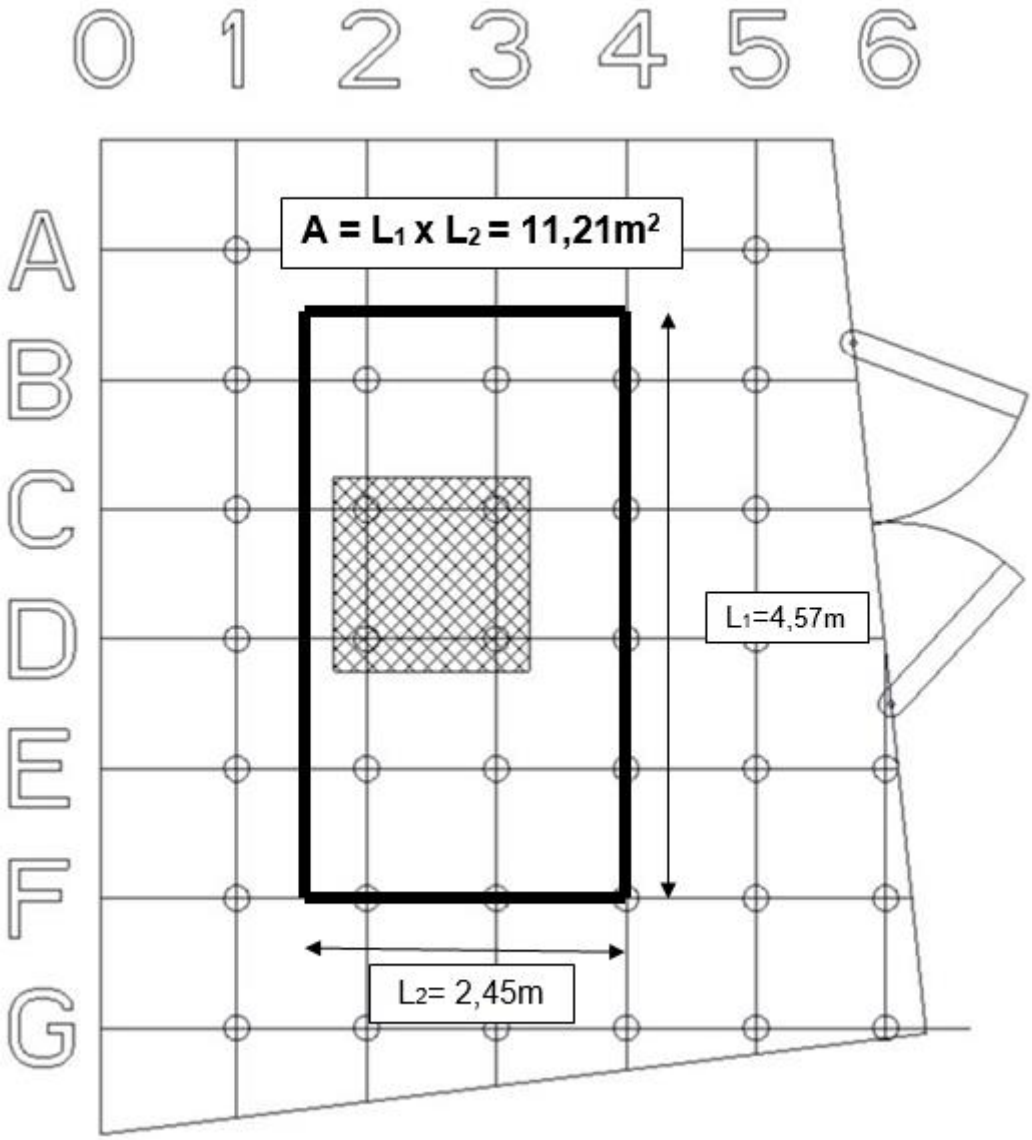


Fig. 2. Scheme of placing the sample in the measuring chamber at the Vibroacoustic Testing Laboratory CTO.

Table 3 shows schedule of test. Test object was seasoned directly in reverberation chamber in Laboratory.

Dimensions of all tested objects: 2450 x 4570 mm. No side surface has been included to measurement, installation type “A”.

Table 3. Schedule of test

No. test object	**Action**	**Date**
LA1895	Delivery date	28.12.2022
	Acclimatization	03.01.2023
	Installation	03.01.2023
	Measurement	03.01.2023
	Removal of the test object	03.01.2023

4. Measurement

Study was carried out in accordance with method described in PN-EN ISO 354:2005. Before the measurement, calibration of measuring channels was performed and conditions in reverberation chamber were written down. Test was done with two microphones in 6 positions at 2 heights and 2 positions of sound source. For each arrangement measurement was repeated 3 times. A total of 72 measurements was done for the test.

5. Analysis and test result

After the test, data from the analyzer were uploaded to *Nor 850 – Building Acoustics* application and analyzed. The analysis resulted with a graph showing sound absorption as a function of frequency in 1/3 octave band, together with reverberation time. According to "PN-EN ISO 11654:1999: *Acoustics — Sound absorbers for use in buildings — Rating of sound absorption*" sound absorption index α_W and class were evaluated. The results are presented in table 4.

Table 4. Test result: sound absorption coefficient, index and class – test object No. LA1895

Sound absorption coefficient according to norm PN-EN ISO 354:2005

Sound absorption measurement in reverberation chamber.

Evaluation of sound absorption index according to PN-EN ISO 11654:1999

Client: Gaudiahome s.r.o., Vysokoskolakov 8421/41, 01008 Zilina, Slovakia **Date of test:** 03.01.2023

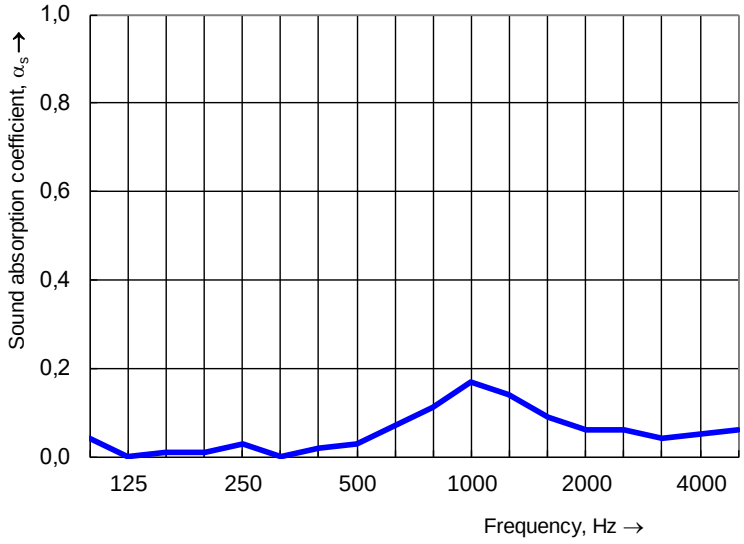
Test room identification: CTO S.A. Environmental Laboratories Division. Vibroacoustic Tests Laboratory

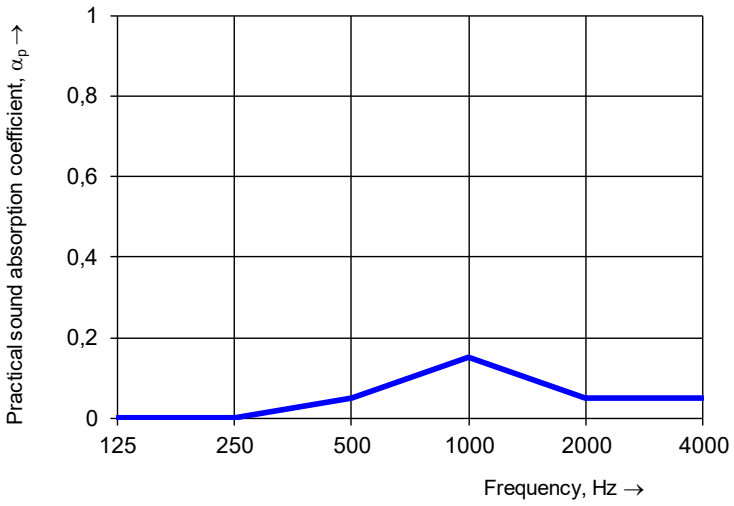
Test object designation: LA1895

Description: Lamelio wall panels made of polystyrene, 116 mm wide and 2540 mm long (dimensions for a single slat), total sample area 11.21 m²

		Empty reverberation chamber:			**Reverberation chamber with test object:**		
Surface area of test object:	11,21 m^2	Relative humidity:	42,3	%	Relative humidity:	42,3	%
Reverberation chamber volume:	200,0 m^3	Air temperature:	19,8	°C	Air temperature:	19,8	°C
		Atmosperic pressure:	101,2	kPa	Atmospheric pressure:	101,2	kPa

Frequency **f** [Hz]	Empty **T1** [s]	Object **T2** [s]	α_s	α_p
100	6,46	6,14	0,04	
125	6,12	6,18	0,00	0,00
160	5,88	5,83	0,01	
200	5,34	5,30	0,01	
250	5,30	5,14	0,03	0,00
315	5,29	5,30	0,00	
400	5,42	5,29	0,02	
500	5,56	5,34	0,03	0,05
630	5,26	4,89	0,07	
800	5,00	4,46	0,11	
1000	4,70	4,01	0,17	0,15
1250	4,45	3,93	0,14	
1600	4,18	3,88	0,09	
2000	3,76	3,58	0,06	0,05
2500	3,29	3,17	0,06	
3150	2,69	2,63	0,04	
4000	2,19	2,14	0,05	0,05
5000	1,74	1,70	0,06	





Sound absorption index and class according to PN-EN ISO 11654:1999

α_w=0,10

Test number: B189502

Date: 03.01.2023 **Sign:** Piotr Jakubowski

Attached to the report:

APPENDIX 1 — Configuration of reverberation chamber

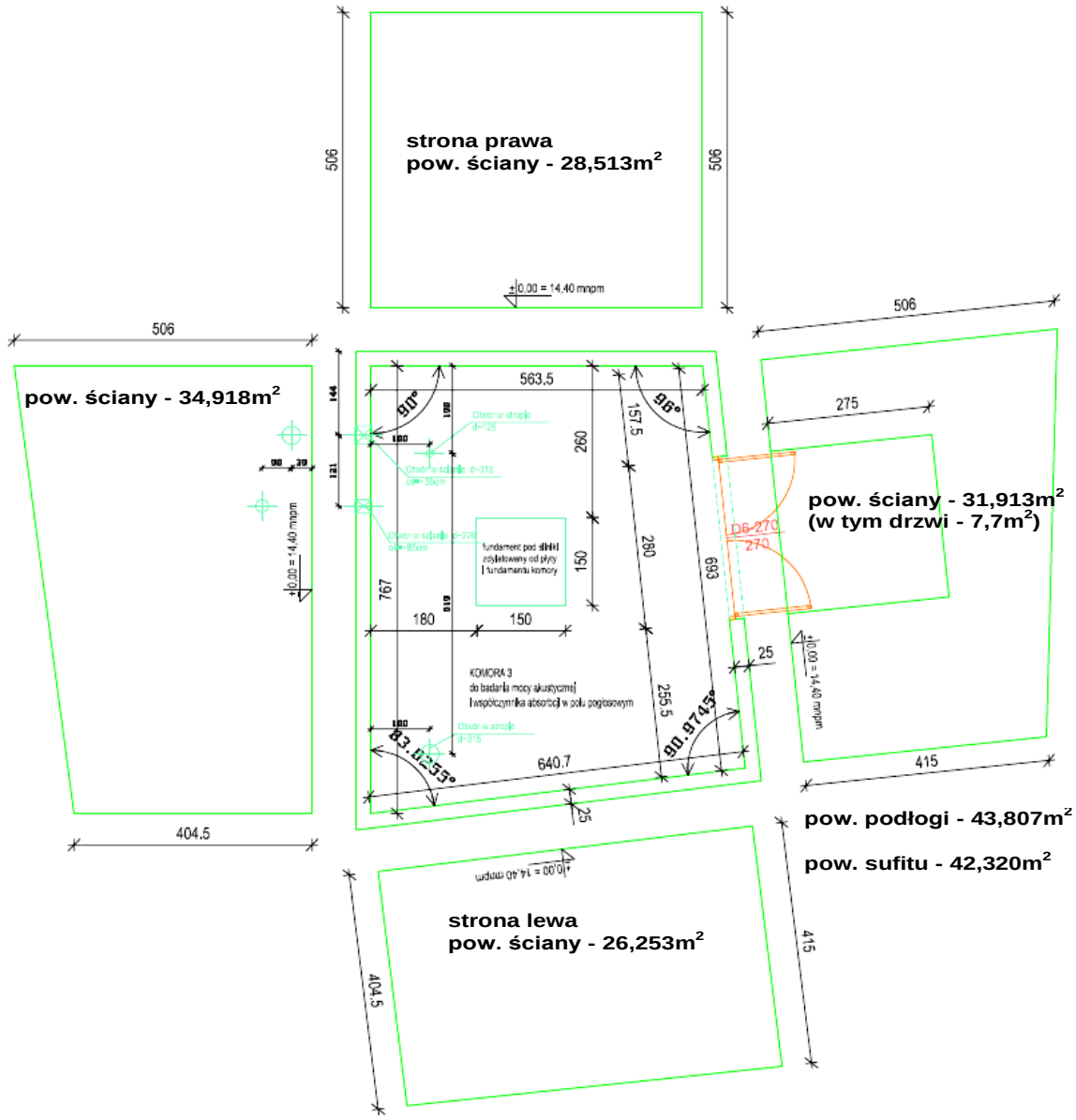
APPENDIX 2 — Technical documentation provided by Customer: *LA1895 test object*

Project leader ***Vibroacoustic Senior Specialist*** ***Head of Vibroacoustic Tests Laboratory***	**Authorised by** ***Acoustics Specialist***	**Supervisor** ***Head of the Environmental Laboratories Division***
 Signed by / Podpisano przez: Piotr Jakubowski Date / Data: 2023-02-16 10:13	 Signed by / Podpisano przez: Adam Waldemar Arentowicz Date / Data: 2023-02-16 10:20	 Signed by / Podpisano przez: Zbigniew Serement Date / Data: 2023-02-16 14:28

P.J.

END OF REPORT

APPENDIX 1 — Configuration of reverberation chamber



Dimensions of the reverberation chamber for sound absorption coefficient αs measurements

Volume and wall surface areas of chamber No. 3

	Chamber	No. 3
volume	V [m³]	200,095
floor	S1 [m²]	43,807
ceiling	S2 [m²]	42,320
on the right	S3 [m²]	28,513
wall with door	S4 [m²]	31,913
on the left	S5 [m²]	26,253
opposite of the door	S6 [m²]	34,918
	total area [m²]	207,724

Diagonals of the reverberation chamber No. 3

Chamber No. 3 [m]
10,77
10,34
10,65
10,25

APPENDIX 2 — Technical documentation provided by Customer: LA1895 test object