Cellule d'étude et de développement
en ingénierie acoustique
Laboratoire Acoustique de l'Université
de Liège

Sart Tilman, the 25th August 2017

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This is a translation of the test report N°2017/7093 dated 25th August 2017

Sound absorption coefficient measurements in laboratory

Decorative panel made of preserved reindeer moss

Type: Decorative panel with preserved reindeer moss

Customer: GREEN MOOD
Atomiumsquare 1 BP 102
1020 Brussels
BELGIUM

Measured performance
according to ISO 11654:1997

α_w = 0,35 (H)

Absorption class D

Ir. A. MAILLARD
Measures responsible

1. General remarks

The measurements were undertaken on 21st August 2017 in the acoustics laboratories of the Institut Montefiore, at the Sart Tilman university campus, by:

- A. MAILLARD, Research engineer at CEDIA

2. Measuring instruments

- 1 electronic calibrator (94 dB at 1000 Hz) Brüel & Kjaer, type 4230 ; serial n° : 1441391
- 1 microphone Larson Davis, type 2541, serial n°: 1850
- 1 cathode follower Brüel & Kjaer, type 2619, serial n°: 971165
- 1 computer with acquisition system 01 dB, type: Symphonie
- 1 rotating arm Brüel & Kjaer, type 3923, serial n : 1357258
- 1 polarisation box Brüel & Kjaer, type 2084, serial n°: 302294
- 1 power amplifier Brüel & Kjaer, type 2706, serial n°: 853026
- 1 noise source with 6 electrodynamic high speakers

3. Measuring conditions

- The measurements of the rating of the sound absorption were carried out following the technical provisions of European standards ISO 354:2003 and ISO 11654:1997.
- The reverberation room is a pyramidal trunk, its volume is 190 m³, and its walls surface is 200 m². The ground dimensions are about 6,5 m x 6,2 m, its height is 5,7 m.
- The room doesn't have any diffusers.
- The sample is composed of several panels placed directly on the floor. The dimensions of the sample are about 3.10 m x 3.10 m. Type A mounting according to ISO 354.
- The description of the sample is given at paragraph 4.
- The sound absorption coefficients are obtained with the measurements of reverberating times of the empty room and after the test specimen has been introduced.
- Reverberating times are calculated using independent decay curves with a one-third octave band pink noise.
- The sound source is placed in 3 positions, the rotating arm records 6 decays in each position, i.e. 18 recordings by each one-third octave band obtained by the interrupted noise method.
- The arithmetic mean of these values gives the needed mean values for the calculation of the equivalent sound absorption area of the sample A_T.
- The formulas are:

$$A_T = 55{,}3V\left(\frac{1}{c_2 T_2} - \frac{1}{c_1 T_1}\right) - 4V(m_2 - m_1) \text{ then } \alpha_S = \frac{A_T}{S}$$

with: A_T is the equivalent sound absorption area of the sample, in m²
T_2 is the reverberation time, in second, in the room with the test specimen
c_2 is the speed of sound in the room with the sample at temperature T_2
m_2 is the power attenuation coefficient using the climatic conditions during the measurements
T_1 , c_1 and m_1 have the same meanings but in the empty room conditions
α_S is the sound absorption coefficient
V is the volume, in m^3, of the reverberation room
S is the test specimen surface, in m^2

4. Description of the test specimen

4.1. Materials

Commercial name: Preserved Reindeer Moss

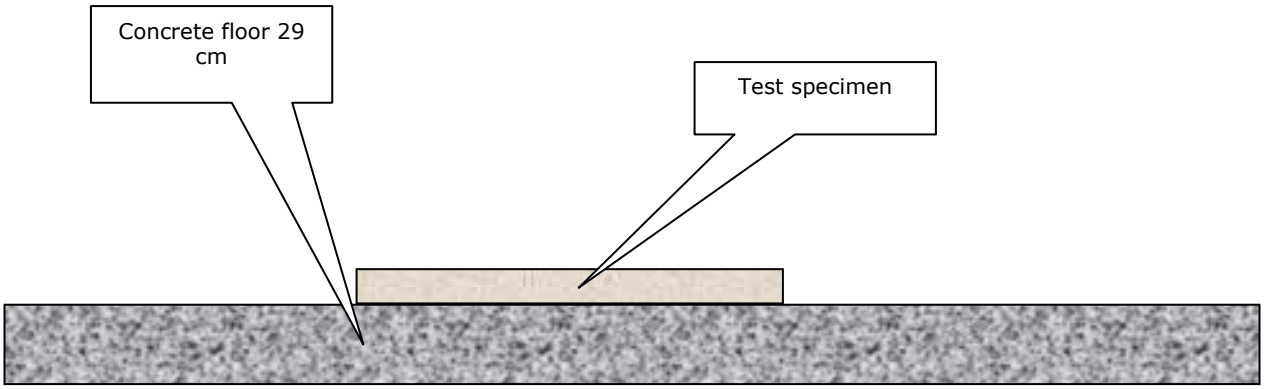
Manufacturer: Green Mood

Composition:
- MDF panel ; thickness: 6 mm,
- Mix of preserved reindeer moss ; average thickness 40 mm,
- The moss is glued to the MDF panel.

4.2. Mounting conditions

The test specimen was placed directly against the concrete floor of the reverberation room of the acoustics laboratory of the University of Liege. The rotating arm was placed in the middle of the test specimen.

The lay out, here under, describes the mounting conditions.



4.3. Sound absorption

The values of the sound absorption coefficient α, and the weighted sound absorption coefficient α_w, according to the standard ISO 11654:1997, are given on page 5 of this report, according to the standard description.

$\alpha_w = 0,35$ (H) Absorption class D

The coefficient α_w has been calculated taking into account an absorbing surface of: 10,27 m².

It is strongly recommended to use this single-number rating in combination with the complete sound absorption coefficient curve.

Frequencies in Hz	125	250	500	1000	2000	4000
α_p	0,10	0,15	0,25	0,40	0,45	0,55

Frequencies in Hertz	50	63	80	100	125	160	200	250	315	400	500
α_S	0,06	0,04	0,06	0,08	0,08	0,07	0,11	0,14	0,19	0,21	0,26

Frequencies in Hertz	630	800	1000	1250	1600	2000	2500	3150	4000	5000
α_S	0,33	0,38	0,39	0,42	0,43	0,46	0,47	0,49	0,51	0,58

4.4. Reverberation time

The table here under shows the mean reverberation times, with:
- T1 reverberation time, in second, in the empty room
- T2 reverberation time, in second, in the room with the test specimen

Frequencies in Hz	50	63	80	100	125	160	200	250	315	400	500
T1 in s	25,00	24,09	19,41	23,53	21,74	15,71	13,64	16,46	14,12	12,56	10,83
T2 in s	17,62	18,65	14,6	15,08	14,31	11,83	9,42	9,71	7,84	6,95	5,88

Frequencies in Hz	630	800	1000	1250	1600	2000	2500	3150	4000	5000
T1 in s	10,69	10,95	10,39	9,42	8,59	7,23	6,07	4,86	3,99	3,02
T2 in s	5,21	4,86	4,72	4,31	4,07	3,62	3,24	2,81	2,44	1,94

Rating of sound absorption coefficient calculated to NBN EN ISO 11654

Client: GREEN MOOD

Test date: 21/08/2017

Description:

Preserved Reindeer Moss

- MDF panel 6 mm
- mix of preserved reindeer moss ; average thickness 40 mm

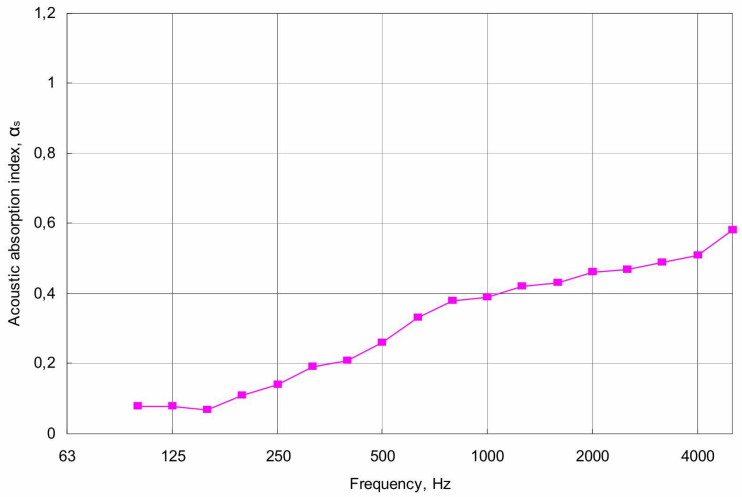
Sample placed on the floor ; Type A mounting

Empty room:	Temperature:	20,8	°C	Humidity:	43,5	%	Pressure: 99,7 kPa
Room with sample:	Temperature:	21,1	°C	Humidity:	41,4	%	Pressure: 99,7 kPa

Chamber volume in m^3 : 190

Sample area in m^2 : 9,61

Frequency Hz	α_s	α_p
100	0,08	
125	0,08	0,10
160	0,07	
200	0,11	
250	0,14	0,15
315	0,19	
400	0,21	
500	0,26	0,25
630	0,33	
800	0,38	
1000	0,39	0,40
1250	0,42	
1600	0,43	
2000	0,46	0,45
2500	0,47	
3150	0,49	
4000	0,51	0,55
5000	0,58	



Calculated to NBN EN ISO 11654 :

α_w= 0,35 (H)

NRC :

Sound absorption class: D

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Picture of the test specimen