

Acoustic test report no 20002

Laboratory	AcouTechLab (Laboratory of Acoustics) Dept. of Mechanical and Industrial Engineering, Tallinn University of Technology, Ehitajate tee 5, 19086, Tallinn, Estonia																																							
Date of test	30.11.2020																																							
Customer	Plaat Detail OÜ, represented by Karmo Lomp (karmo@plaatdetail.ee)																																							
Task	Determination of sound absorption coefficient																																							
Test object	Material sample provided by Plaat Detail OÜ (see also Appendix A1): rib-panels backed with porous acoustic layer, placed directly on the solid surface.																																							
Method	Reverberation room method according to EN ISO 354:2003, see Appendix A3																																							
Equipment	<ul style="list-style-type: none"> • noise level meter Brüel & Kjær 2270 • measurement microphone Brüel & Kjær 4189 • omnidirectional loudspeaker Brüel & Kjær 4292-L • sound amplifier Brüel & Kjær 2734 • acoustic calibrator Brüel & Kjær 4231. 																																							
Results	<p>Sound absorption coefficient of the test sample, see also Appendix A2:</p> <table border="1"> <caption>Sound Absorption Coefficient Data</caption> <thead> <tr> <th>Frequency (Hz)</th> <th>Absorption Coefficient</th> </tr> </thead> <tbody> <tr><td>100</td><td>0.05</td></tr> <tr><td>125</td><td>0.08</td></tr> <tr><td>160</td><td>0.08</td></tr> <tr><td>200</td><td>0.07</td></tr> <tr><td>250</td><td>0.15</td></tr> <tr><td>315</td><td>0.15</td></tr> <tr><td>400</td><td>0.18</td></tr> <tr><td>500</td><td>0.28</td></tr> <tr><td>630</td><td>0.42</td></tr> <tr><td>800</td><td>0.58</td></tr> <tr><td>1 k</td><td>0.78</td></tr> <tr><td>1.25 k</td><td>0.95</td></tr> <tr><td>1.6 k</td><td>1.05</td></tr> <tr><td>2 k</td><td>1.02</td></tr> <tr><td>2.5 k</td><td>1.02</td></tr> <tr><td>3.15 k</td><td>0.98</td></tr> <tr><td>4 k</td><td>0.88</td></tr> <tr><td>5 k</td><td>0.82</td></tr> </tbody> </table>		Frequency (Hz)	Absorption Coefficient	100	0.05	125	0.08	160	0.08	200	0.07	250	0.15	315	0.15	400	0.18	500	0.28	630	0.42	800	0.58	1 k	0.78	1.25 k	0.95	1.6 k	1.05	2 k	1.02	2.5 k	1.02	3.15 k	0.98	4 k	0.88	5 k	0.82
Frequency (Hz)	Absorption Coefficient																																							
100	0.05																																							
125	0.08																																							
160	0.08																																							
200	0.07																																							
250	0.15																																							
315	0.15																																							
400	0.18																																							
500	0.28																																							
630	0.42																																							
800	0.58																																							
1 k	0.78																																							
1.25 k	0.95																																							
1.6 k	1.05																																							
2 k	1.02																																							
2.5 k	1.02																																							
3.15 k	0.98																																							
4 k	0.88																																							
5 k	0.82																																							
Test conditions	Temperature: 21.9°C. humidity: 62%. barometric pressure: 99.7kPa																																							
Responsible for tests	Prof. Jüri Lavrentjev (juri.lavrentjev@ttu.ee) Govt Certified Expert in Tech. Acoustics, PhD in Tech. Acoustics																																							

Appendices:

A1: OBJECTS TESTED

Rib-panels backed with porous material layer made from pressed felt. The thickness of the felt was 10 mm, the ribs, made from MDF had thickness of 13 mm and width 26 mm. The space between the ribs was 14 mm. The total area of panels used in tests was 2.9 m², see Photo A1-1. For measurements, the panels were placed directly on the concrete wall of the reverberation room.

The test method is described in Appendix A3.



Photo A1-1. The test object in the measurement room.

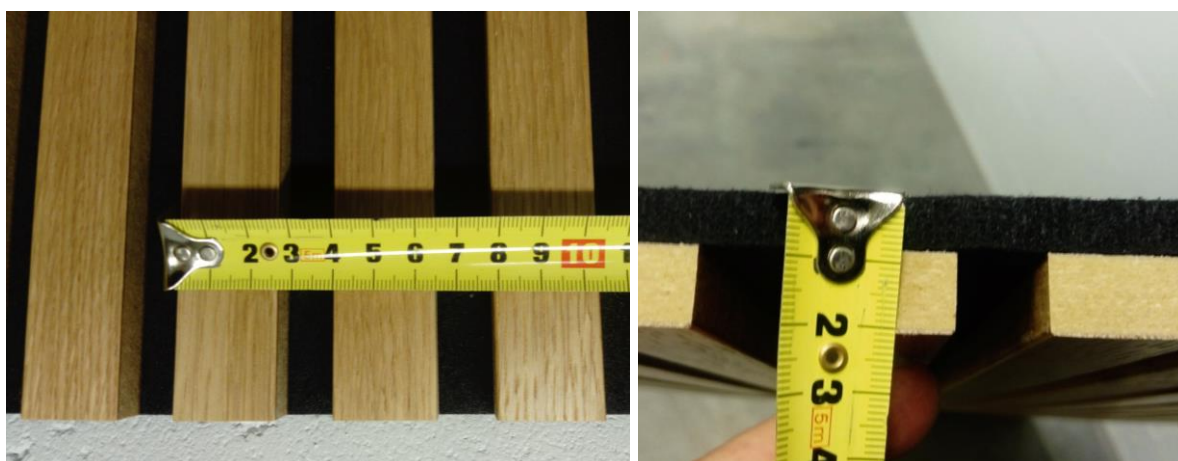


Photo A1-2. Top view of the panel.

A2. RESULTS:

The calculated absorption coefficients in the third-octave bands in the frequency range 100-5000 Hz are presented in Figure A2-1.

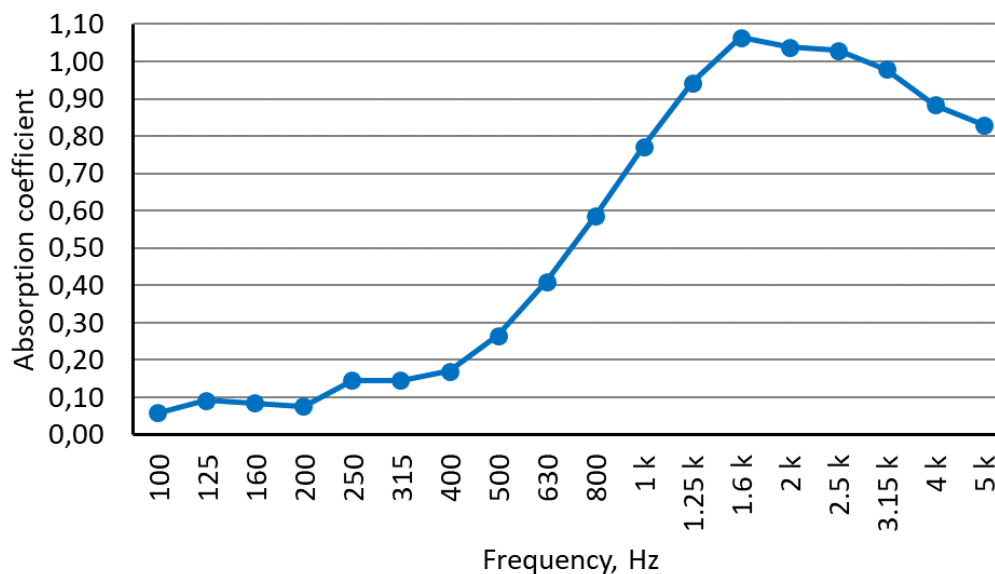


Figure A2-1. Measured and calculated absorption coefficient.

According to EN ISO 354:2003, the measured reverberation times are presented in Table A2-1.

Table A2-1. Measured reverberation times

Third-octave band central frequency, Hz	100	125	160	200	250	315	400	500	630	800	1 k	1.25 k	1.6 k	2 k	2.5 k	3.15 k	4 k	5 k
Reverb. time with object (T2), s	3,09	3,46	3,09	3,14	2,96	2,87	2,96	2,73	2,24	2,00	1,75	1,57	1,47	1,45	1,41	1,37	1,32	1,23
Reverb. time empty room (T1), s	3,25	3,79	3,33	3,36	3,35	3,24	3,42	3,41	2,99	2,94	2,75	2,63	2,54	2,45	2,32	2,16	1,93	1,69

Laurentjes

A3. TEST METHOD

Laboratory room:

Rectangular reverberation room with masonry concrete block walls (see Photo A3-1), with the wall mass greater than 400 kg/m² (class: heavy). Dimensions of the room: 2.8 x 4.0 x 5.9 m. Total area of the walls: 55.4 m², of the floor: 23.6 m² and of the ceiling: 23.6 m². An appropriate system of sound diffusers has been installed according to EN ISO 354:2003.

Equipment:

- noise level meter Brüel & Kjær 2270
- measurement microphone Brüel & Kjær 4189
- omnidirectional loudspeaker Brüel & Kjær 4292-L
- sound amplifier Brüel & Kjær 2734
- acoustic calibrator Brüel & Kjær 4231.

All equipment follows class 1 rating and is calibrated.

Method:

The measurements were carried out according to standard EN ISO 354:2003. The reverberation time was measured with and then without the tested object. The interrupted noise method with white noise was applied. The frequency range was set to 100 – 5000 Hz. For both measurement cases 2 different loudspeaker positions and 6 microphone positions were used. For each measurement case the average value of 3 reverberation times was calculated.



Photo A3-1. The installation of test objects (acoustic material sample) in AcouTechLab reverberation room. Omnidirectional acoustic source (loudspeaker) and tripod mounted measurement microphone are exhibited in the background.

Laurentius