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This edition replaces earlier report 17-202-R1, dated 2017-08-25. New measurements of the 40 mm board replaces the old ones and a 50 mm board was additionally measured and included in this report.

ABSORPTION MEASUREMENTS FOR KONTO ACOUSTICS FROM KONTO

CONCLUSIONS

The sound absorption for Konto Acoustics with thickness 20, 30, 40 and 50 mm, from Konto has been measured according to the reverberation room method (SS-EN ISO 354:2003) and evaluated according to SS-EN ISO 11654:1997. The materials were measured in a grid for suspended ceilings at five or six different heights. The results as weighted sound absorption coefficient and sound absorption class are presented in the table below.

Measurement protocol/Test object	Mounting type	α_w	Absorption class
M1 Konto acoustic board 20 mm.	A	0.50(MH)	D
M2	E-50	0.55(MH)	D
M3	E-100	0.75(MH)	C
M4	E-200	0.90	A
M5	E-400	0.85(H)	B
M6	E-700	0.80(H)	B
M7 Konto acoustic board 30 mm.	A	0.60(H)	C
M8	E-50	0.65(H)	C
M9	E-100	0.75(MH)	C
M10	E-200	0.90	A
M11	E-400	0.85(H)	B
M12	E-700	0.80(H)	B
M13a Konto acoustic board 40 mm.	A	0.70(H)	C
M14a	E-50	0.70(MH)	C
M15a	E-100	0.85(H)	B
M16a	E-200	0.95	A
M17a	E-400	0.95	A
M18a	E-700	0.85(H)	B
M19 Konto acoustic board 50 mm.	A	0.85(H)	B
M20	E-100	1.00	A
M21	E-200	1.00	A
M22	E-400	1.00	A
M23	E-700	1.00	A

1. CLIENT

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2. ASSIGNMENT

To measure the sound absorption coefficient for Konto Acoustics acoustic board from Konto with thickness 20, 30, 40 and 50 mm according to SS-EN ISO 354:2003 and evaluate the results according to SS-EN ISO 11654:1997.

3. TEST OBJECTS

Konto Acoustics is a natural peat fibre slab with painted surface, 108 kg/m^3. The size of each panel was 600 x 1200 mm. The product was tested in 20, 30, 40 and 50 mm thickness. The panels were placed in a grid for suspended ceilings and tested at five or six heights – direct fixing (Type A), 50 mm, 100 mm, 200 mm, 400 mm and 700 mm. Figure 1 shows a photo of the measurement setup.

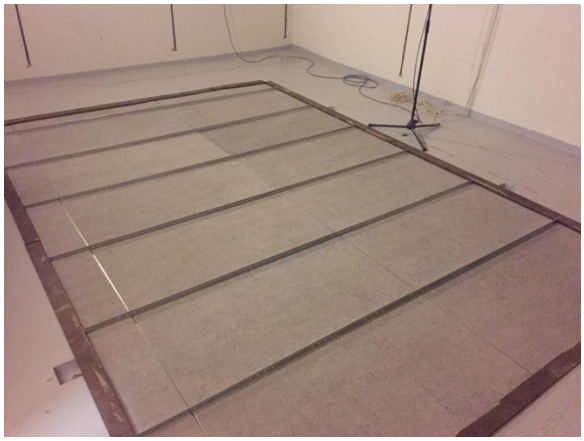

Figure 1: Konto Acoustics 30 mm placed in grid for suspended ceiling

4. MEASUREMENT PROCEDURE

The absorption measurements were performed according to the standard SS-EN ISO 354:2003. The measurements were made with three speaker positions and four microphone positions. The results for absorption coefficient were evaluated according to SS-EN ISO 11654:1997. The test specimen area fulfils the requirements in SS-EN ISO 354:2003.

The measurements were performed by Carl Nyqvist 2017-08-17 and 2017-10-25 in Akustikverkstan's reverberation room in Skultorp, Skövde. More information on the test facilities can be found in Appendix 2.

5. MEASUREMENT EQUIPMENT

Table 1 lists the equipment used during the measurements. The equipment fulfils class 1 according to SS-EN 61672-1, 60942 and 61260. Date for the latest calibration is available in Akustikverkstan's instrument journal.

Instrument	Manufacture and type	Serial number	Internal designation
Measurement computer	HP ZBook	-	DA02
Front end	National Instruments NI 9233	12BBBEE/ 12ABAA8	AN04
Microphone	Roga MI-17	592	MI04
Microphone	Roga MI-17	593	MI05
Microphone	Roga MI-17	594	MI06
Microphone	Roga MI-17	595	MI07
Speaker	IMA Kub 1	8	HÖ7
Speaker	IMA Kub 1	9	HÖ8
Speaker	IMA Kub 1	10	HÖ9
Equalizer	Monacor MEQ-2152	-	Lab
Amplifier	Denon POA-2200	-	Lab

Table 1: Equipment used during the measurements.

6. RESULTS

The weighted sound absorption coefficient and sound absorption class for the measurements are listed in table 2. Detailed measurement results for all test specimens are available in the measurement protocols belonging to this report 17-202-M1 to M23. The results are only valid for the tested samples.

Measurement protocol/Test object	Mounting type	α_w	Absorption class
M1 Konto acoustic board 20 mm.	A	0.50(MH)	D
M2	E-50	0.55(MH)	D
M3	E-100	0.75(MH)	C
M4	E-200	0.90	A
M5	E-400	0.85(H)	B
M6	E-700	0.80(H)	B
M7 Konto acoustic board 30 mm.	A	0.60(H)	C
M8	E-50	0.65(H)	C
M9	E-100	0.75(MH)	C
M10	E-200	0.90	A
M11	E-400	0.85(H)	B
M12	E-700	0.80(H)	B
M13a Konto acoustic board 40 mm.	A	0.70(H)	C
M14a	E-50	0.70(MH)	C
M15a	E-100	0.85(H)	B
M16a	E-200	0.95	A
M17a	E-400	0.95	A
M18a	E-700	0.85(H)	B
M19 Konto acoustic board 50 mm.	A	0.85(H)	B
M20	E-100	1.00	A
M21	E-200	1.00	A
M22	E-400	1.00	A
M23	E-700	1.00	A

Table 2: Results according to SS-EN ISO 11654:1997 for the different specimens from Konto.

7. MEASUREMENT UNCERTAINTY

The uncertainties in the measured sound absorption coefficients have been estimated to the values in table 3. The uncertainty corresponds to one standard deviation.

50 Hz	**63 Hz**	**80 Hz**	**100 Hz**	**125 Hz**	**160 Hz**	**200 Hz**
± 0.10	± 0.08	± 0.07	± 0.06	± 0.05	± 0.04	± 0.03
250 Hz	**315 Hz**	**400 Hz**	**500 Hz**	**630 Hz**	**800 Hz**	**1 kHz**
± 0.03	± 0.03	± 0.03	± 0.03	± 0.03	± 0.03	± 0.03
1,25 kHz	**1,6 kHz**	**2 kHz**	**2,5 kHz**	**3,15 kHz**	**4 kHz**	**5 kHz**
± 0.03	± 0.03	± 0.03	± 0.03	± 0.03	± 0.03	± 0.03

Table 3: Measurement uncertainty for each one-third octave band.

This report should always be used in its complete context, even though the measurement protocols may be used independently.

Carl Nyqvist

Reviewed by Johan Jernstedt, 2017-11-02

APPENDIX 1: MEASURED REVERBERATION TIMES

f(Hz)	Empty 2017-08-17	Konto Acoustics 20 mm, Type A mounting	Konto Acoustics 20 mm, E-50	Konto Acoustics 20 mm, E-100	Konto Acoustics 20 mm, E-200	Konto Acoustics 20 mm, E-400	Konto Acoustics 20 mm, E-700	Konto Acoustics 30 mm, Type A mounting	Konto Acoustics 30 mm, E-50	Konto Acoustics 30 mm, E-100
50	9.25	10.07	9.45	8.81	7.54	6.18	5.88	9.48	9.39	8.60
63	9.31	9.26	8.96	8.40	7.36	6.92	6.78	8.73	8.43	8.01
80	8.30	7.76	7.38	6.78	5.73	4.80	3.73	7.11	7.04	6.50
100	7.58	7.02	6.70	5.90	4.99	4.16	4.11	6.49	6.38	5.75
125	6.51	5.87	5.58	4.96	3.83	3.00	3.28	5.35	5.32	4.96
160	5.63	5.04	4.69	3.94	3.32	2.80	2.59	4.49	4.33	3.84
200	5.54	4.51	4.31	3.78	2.85	2.58	2.65	3.94	3.92	3.69
250	5.47	4.16	3.86	3.24	2.54	2.28	3.06	3.65	3.57	3.19
315	5.42	3.68	3.29	2.66	2.19	2.24	2.68	3.17	3.11	2.63
400	5.17	3.08	2.71	2.24	2.01	2.38	2.36	2.70	2.58	2.24
500	4.73	2.67	2.31	2.00	1.90	2.41	2.14	2.43	2.28	2.01
630	4.30	2.26	1.96	1.80	1.83	2.02	1.97	2.09	2.03	1.85
800	4.80	2.33	2.02	1.86	2.06	2.03	2.11	2.21	2.13	1.90
1000	4.69	2.20	1.94	1.85	2.14	2.07	2.02	2.13	2.07	1.89
1250	4.12	2.03	1.86	1.83	1.92	1.92	1.92	1.98	1.96	1.87
1600	3.82	1.81	1.75	1.83	1.78	1.80	1.79	1.82	1.80	1.85
2000	3.38	1.73	1.71	1.77	1.73	1.74	1.73	1.75	1.75	1.77
2500	3.16	1.59	1.60	1.63	1.61	1.61	1.62	1.63	1.63	1.62
3150	2.78	1.48	1.51	1.49	1.51	1.49	1.50	1.51	1.53	1.50
4000	2.40	1.37	1.37	1.37	1.38	1.37	1.37	1.40	1.39	1.38
5000	1.97	1.22	1.20	1.21	1.21	1.21	1.21	1.23	1.21	1.22

Test area (m^2)	-	10	10	10	10	10	10	10	10	10
Temperature (°C)	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
RH (%)	71	71	70	70	70	70	70	70	70	70

f(Hz)	Konto Acoustics 30 mm, E-200	Konto Acoustics 30 mm, E-400	Konto Acoustics 30 mm, E-700	Konto Acoustics 40 mm, Type A mounting	Konto Acoustics 40 mm, E-50	Konto Acoustics 40 mm, E-100	Konto Acoustics 40 mm, E-200	Konto Acoustics 40 mm, E-400	Konto Acoustics 40 mm, E-700
50	7.51	6.06	5.61	9.15	8.97	8.50	7.29	6.24	5.65
63	7.04	6.67	6.43	8.31	8.21	7.97	6.51	6.60	6.50
80	5.69	4.88	3.79	7.04	6.94	6.54	5.72	4.78	3.61
100	4.94	4.17	4.25	6.45	6.33	5.63	4.53	3.61	3.49
125	4.09	3.16	3.46	5.59	5.51	5.08	4.14	3.20	3.21
160	3.44	2.94	2.71	4.16	4.18	3.78	3.28	2.88	2.70
200	2.87	2.50	2.74	3.68	3.64	3.35	2.68	2.49	2.71
250	2.55	2.35	3.10	3.35	3.30	2.88	2.38	2.28	2.93
315	2.23	2.30	2.77	2.88	2.87	2.50	2.08	2.13	2.69
400	2.01	2.40	2.41	2.40	2.39	2.13	1.93	2.24	2.21
500	1.94	2.40	2.14	2.20	2.18	1.93	1.91	2.26	2.07
630	1.90	2.02	1.98	2.01	2.00	1.78	1.82	1.89	1.95
800	2.10	2.05	2.11	2.02	2.00	1.89	2.04	1.99	1.99
1000	2.14	2.08	2.02	2.05	2.01	1.89	2.09	2.02	1.97
1250	1.96	1.92	1.93	1.89	1.88	1.86	1.88	1.87	1.85
1600	1.79	1.80	1.80	1.82	1.80	1.80	1.77	1.79	1.80
2000	1.73	1.76	1.75	1.69	1.73	1.72	1.70	1.70	1.68
2500	1.62	1.61	1.62	1.58	1.58	1.57	1.55	1.56	1.57
3150	1.51	1.51	1.50	1.44	1.44	1.42	1.44	1.42	1.42
4000	1.38	1.38	1.37	1.28	1.28	1.28	1.29	1.27	1.28
5000	1.21	1.22	1.22	1.09	1.11	1.11	1.11	1.12	1.12

Test area (m^2)	10	10	10	10	10	10	10	10	10
Temperature (°C)	17.0	17.0	17.0	15.7	15.7	15.7	15.7	15.7	15.5
RH (%)	70	70	70	52	52	53	53	53	54

f(Hz)	Empty 2017-08-17	Konto Acoustics 50 mm, Type A mounting	Konto Acoustics 50 mm, E-100	Konto Acoustics 50 mm, E-200	Konto Acoustics 50 mm, E-400	Konto Acoustics 50 mm, E-700
50	8.89	9.67	8.88	7.14	6.06	5.51
63	9.07	8.49	7.90	6.70	6.61	6.55
80	8.00	6.92	6.39	5.31	4.36	3.24
100	7.34	6.21	5.39	4.07	3.25	3.06
125	6.92	5.52	4.89	3.51	2.73	2.71
160	5.74	3.93	3.48	2.94	2.58	2.54
200	5.54	3.43	3.05	2.51	2.29	2.38
250	5.38	2.90	2.41	2.21	2.12	2.58
315	5.41	2.44	2.12	1.89	1.97	2.34
400	5.13	2.07	1.85	1.75	1.97	2.00
500	4.62	1.94	1.76	1.79	2.01	1.89
630	4.29	1.78	1.68	1.70	1.75	1.76
800	4.85	1.81	1.79	1.84	1.83	1.82
1000	4.71	1.84	1.79	1.89	1.86	1.83
1250	4.09	1.75	1.75	1.75	1.75	1.75
1600	3.79	1.68	1.69	1.68	1.70	1.69
2000	3.31	1.61	1.61	1.61	1.61	1.61
2500	3.01	1.50	1.47	1.49	1.48	1.49
3150	2.60	1.38	1.38	1.39	1.39	1.39
4000	2.16	1.24	1.24	1.25	1.26	1.26
5000	1.76	1.10	1.10	1.09	1.10	1.10

Test area (m^2)	-	10	10	10	10	10
Temperature (°C)	15.0	14.8	14.9	14.9	15.0	15.0
RH (%)	57	56	57	57	57	57

APPENDIX 2: INFORMATION ABOUT THE REVERBERATION ROOM

The reverberation room is rectangular, measuring Length x Width x Height = 5.85 x 4.65 x 7.35 m. The room volume is 200 m^3 and the total area of the walls, ceiling and floor is 209 m^2. There are 22 diffusors (size 0.775 x 1.25 m) randomly installed in the room. The reverberation time between 50 and 200 Hz is controlled with membrane absorbers on the walls.
The test specimen is put on the floor on the mounting area (size 3.85 x 2.6 m) according to figure B2.1. The mounting area consists of a concrete slab that can be lowered up to 700 mm below the floor.

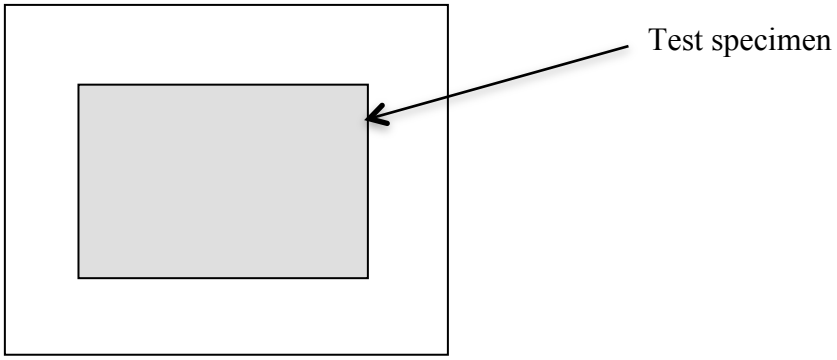

Figure B2.1: Plane drawing of the reverberation room with the test specimen put on the mounting area.

The address to the laboratory is Vallmovägen 11, 541 55 Skövde, Sweden