AKUSTIKVERKSTAN

Report 19-727-R1
2019-07-09
5 pages, 7 appendices

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SOUND ABSORPTION MEASUREMENTS FOR SANDATEX

CONCLUSIONS

The sound absorption coefficient for five roller blind fabrics from Sandatex has been measured according to the reverberation room method SS-EN ISO 354:2003. The measurements have been evaluated according to SS 25269:2013 and SS-EN ISO 11654:1997.

The results as weighted sound absorption coefficient and sound absorption class are presented in the table below.

Test object	α_w	Absorption class
Clear Alu	0.30	D
Zilario 3 Eco Alu	0.25	E
Apollo BO	0.05	-
Starlet	0.0	-
Skyscreen Alu	0.20	E

1. CLIENT

SANDATEX I BORÅS AB, Elementgatan 12, 504 64 Borås, Sweden

Contact: Michael Johansson email: michael@sandatex.se, phone: +46 (0) 33-720 62 69

2. ASSIGNMENT

To measure the sound absorption for five roller blind fabrics from Sandatex according to SS-EN ISO 354:2003 and evaluate according to SS 25269:2013 and SS-EN ISO 11654:1997.

3. TEST OBJECTS

The test objects are different types of roller blind fabrics. A complete list of the products fabric, size, density, and thickness are presented in table 1.

Test object	Fabric	Width	Density	Thickness
Clear Alu	100% PES with thin coating of aluminium	285 cm	240 g/m^2	0.50 mm
Zilario 3 Eco Alu	100% recycled PET with thin coating of aluminium	240 cm	226 g/m^2	0.46 mm
Apollo BO	100% PES	310 cm	430 g/m^2	0.55 mm
Starlet	100% recycled PET	310 cm	215 g/m^2	0.35 mm
Skyscreen Alu	100% PES with thin coating of aluminium	290 cm	260 g/m^2	0.37 mm

Table 1: list of measured roller blind fabrics.

For the measurement all test objects have been cut and taped to form the size 2.90 x 3.45 m (10 m^2). All test objects have been hung 10 cm from a wall (G-100 mounting) attached to a beam by small clips. Pictures of each test object can be seen in figure 1 – 5.

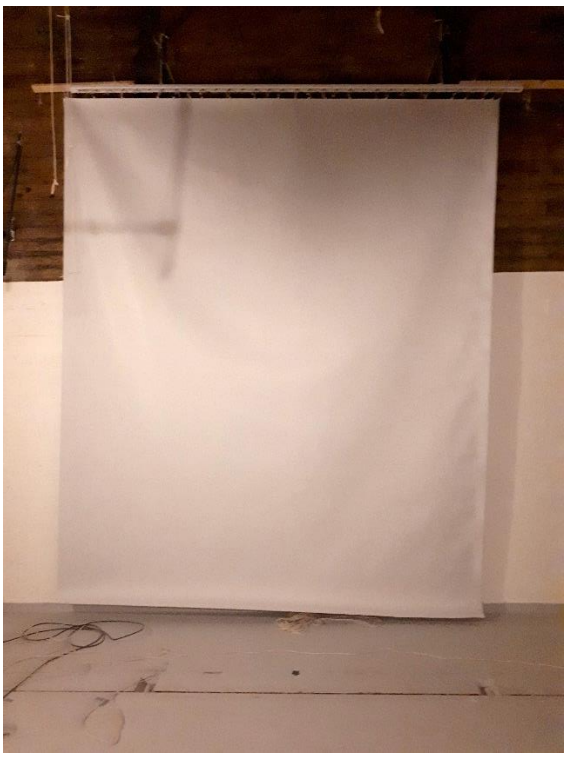


Figure 1: Mounting of Clear Alu.

Figure 2: Mounting of Zilario 3 ECO Alu.

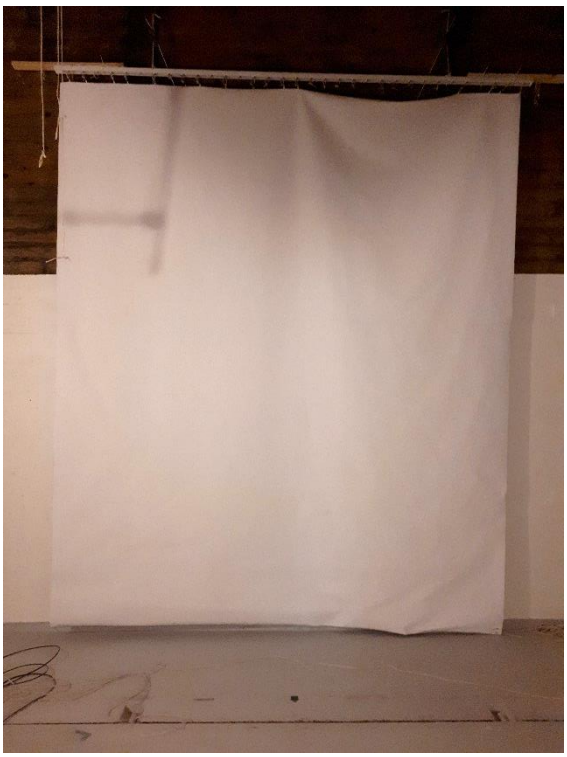


Figure 3: Mounting of Apollo BO.

Figure 4: Mounting of Starlet.

Figure 5: Mounting of Skyscreen Alu.

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 sound absorption coefficient were evaluated according to SS 25269:2013 and SS-EN ISO 11654:1997. The test specimen area fulfils the requirements in SS-EN ISO 354:2003.

The measurements were performed by Staffan Andersson 2019-05-29 in Akustikverkstan's reverberation room in Skultorp, Skövde, Sweden. More information on the test facilities can be found in Appendix 2.

5. MEASUREMENT EQUIPMENT

Table 2 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 the instrument journal of Akustikverkstan.

Instrument	Manufacture and type	Serial number	Internal designation
Measurement computer	HP Zbook		DA02
Front end	National Instruments NI 9234	1918620/190DB0B	AN05
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 2: Equipment used during the measurements.

6. RESULTS

Detailed measurement results for all test specimens are available in the measurement protocols belonging to this report 19-772-M1 to M5. The results are only valid for the tested samples. The results as weighted sound absorption coefficient and sound absorption class are presented in table 3.

Test object	α_w	Absorption class	Measurement protocol
Clear Alu	0.30	D	M1
Zilario 3 Eco Alu	0.25	E	M2
Apollo BO	0.05	-	M3
Starlet	0.0	-	M4
Skyscreen Alu	0.20	E	M5

Table 3: Weighted sound absorption coefficient and sound absorption class for the measured product.

7. MEASUREMENT UNCERTAINTY

The uncertainties in the measured sound absorption coefficients have been estimated to the values in table 4. The uncertainty corresponds to one standard deviation. The uncertainties for the sound absorption area measurement are concluded from the same values multiplied with the test specimen area.

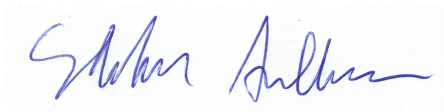
50 Hz	**63 Hz**	**80 Hz**	**100 Hz**	**125 Hz**	**160 Hz**	**200 Hz**
± 0.10	± 0.08	± 0.07	± 0.06	± 0.05	± 0.04	± 0.03
250 Hz	**315 Hz**	**400 Hz**	**500 Hz**	**630 Hz**	**800 Hz**	**1 kHz**
± 0.03	± 0.03	± 0.03	± 0.03	± 0.03	± 0.03	± 0.03
1,25 kHz	**1,6 kHz**	**2 kHz**	**2,5 kHz**	**3,15 kHz**	**4 kHz**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

Table 4: Measurement uncertainty for each third octave.

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

8. DEVIATIONS FROM THE TEST PROCEDURE

No deviations from the standards mentioned in this report have been done.



Staffan Andersson
Akustikverkstan

Reviewed by Magnus Karlsson 2019-07-08

APPENDIX 1: MEASURED REVERBERATION TIMES

f (Hz)	Empty	Clear Alu	Zilario 3 ECO Alu	Apollo BO	Starlet	Skyscreen Alu
50	8.08	8.09	7.97	8.09	8.04	8.14
63	8.77	8.58	8.52	8.67	8.64	8.64
80	7.91	7.80	7.83	8.01	7.99	7.80
100	6.67	6.36	6.33	6.49	6.50	6.38
125	5.94	5.80	5.79	6.00	5.95	5.87
160	5.23	4.89	4.92	4.98	5.07	5.01
200	5.44	4.81	4.97	5.11	5.30	5.14
250	5.13	4.50	4.65	5.08	5.08	4.80
315	5.14	4.35	4.55	5.14	5.07	4.76
400	4.96	3.84	4.16	4.84	4.93	4.31
500	4.62	3.40	3.70	4.51	4.59	3.78
630	4.25	2.91	3.25	4.13	4.18	3.34
800	4.63	2.93	3.28	4.43	4.52	3.48
1000	4.58	2.89	3.21	4.42	4.51	3.44
1250	4.02	2.69	2.92	3.87	3.88	3.14
1600	3.62	2.68	2.92	3.56	3.53	3.09
2000	3.27	2.42	2.64	3.14	3.17	2.69
2500	2.90	2.18	2.29	2.80	2.79	2.37
3150	2.53	1.92	2.01	2.38	2.40	2.09
4000	2.11	1.62	1.70	1.96	1.97	1.74
5000	1.69	1.34	1.36	1.57	1.57	1.41

test area (m^2)	0.0	10.0	10.0	10.0	10.0	10.0
Temperature (°C)	17.0	17.0	17.0	17.0	17.0	17.0
RH (%)	51	46	46	46	47	46

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 (10 m^2, 2.6 x 3.85 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.

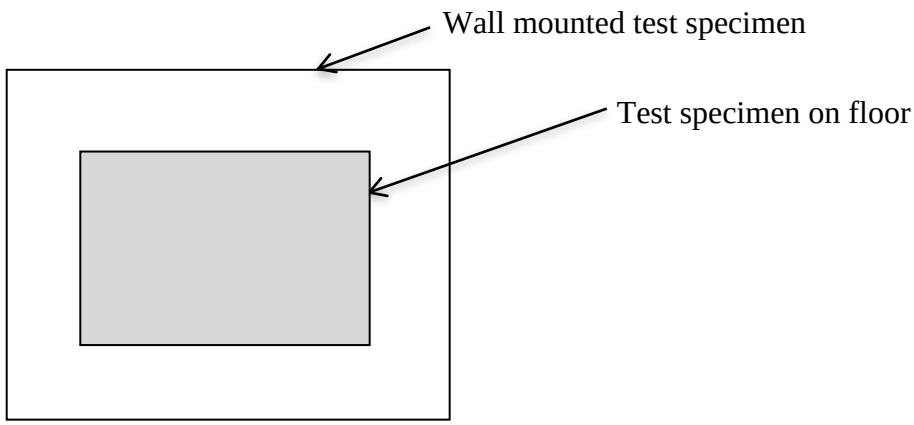


Figure B2.1: Plane drawing of the reverberation room with the positions of the test specimens.

Clear Alu

SOUND ABSORPTION COEFFICIENT ACCORDING TO ISO 354 AND ISO 11654

Measurement of sound absorption coefficient in a reverberation room

Report number: 19-727-M1

Date 2019-06-24

Frequency f [Hz]	Sound absorption coefficient α_s	α_p
50	0.00	
63	0.01	0.00
80	0.01	
100	0.02	
125	0.01	0.00
160	0.04	
200	0.08	
250	0.09	0.10
315	0.12	
400	0.19	
500	0.25	0.25
630	0.35	
800	0.41	
1000	0.41	0.40
1250	0.40	
1600	0.31	
2000	0.33	0.35
2500	0.35	
3150	0.37	
4000	0.40	0.40
5000	0.41	

α_w = 0.30

Absorption class = D

Client: Sandatex

Manufacturer: Sandatex

Product identification: Clear Alu

Description of test specimen: Fabric made of 100% PES, 240 g/m^2, thickness 0.55 mm, thin coating of aluminium. Type G-100 Mounting.

Reverberation room volume: 200 m^3

Temperature: 17.0 °C (empty: 17.0 °C)

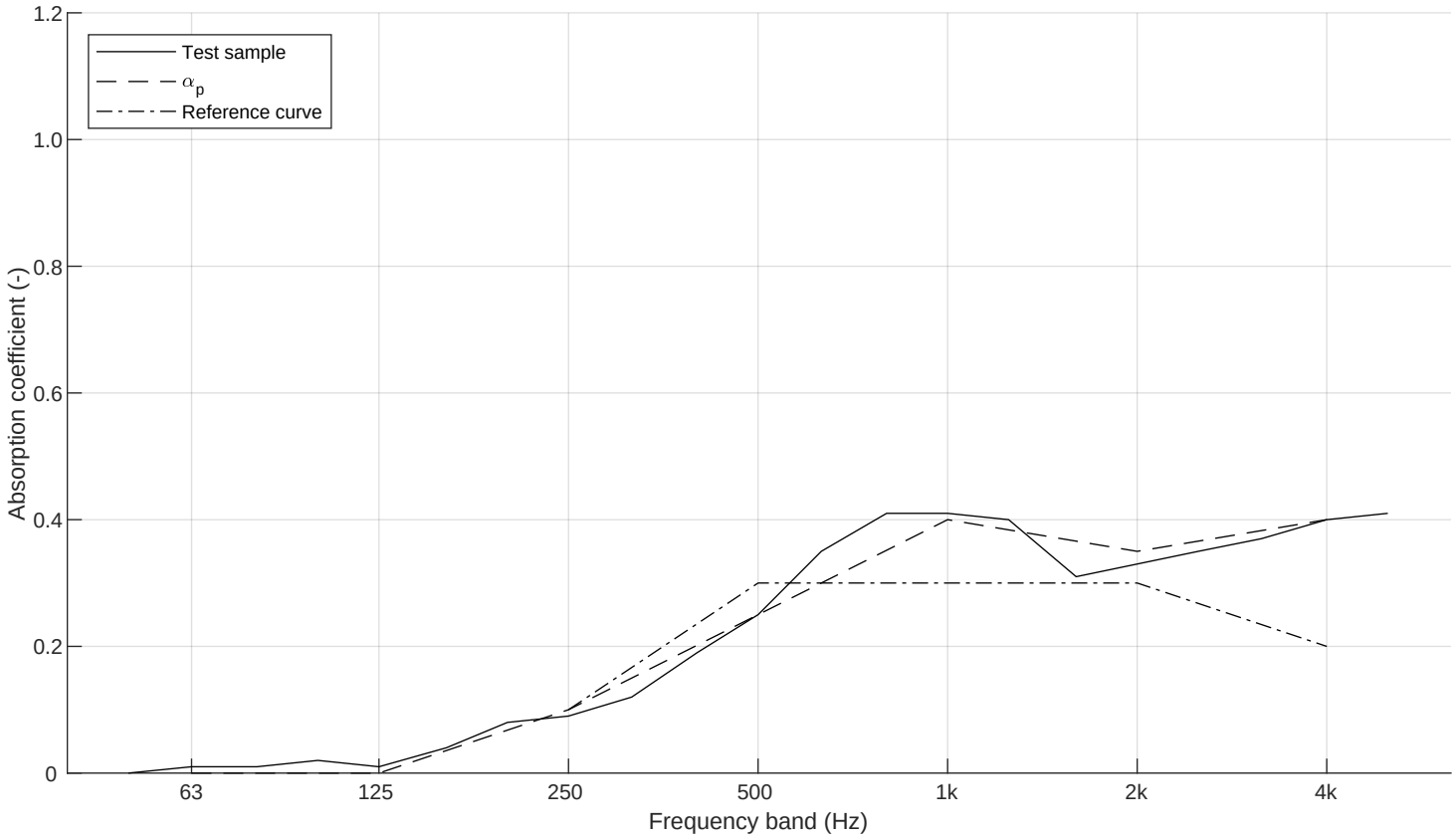
Air humidity: 46 % (empty: 51 %)

Air pressure: 98.8 kPa (empty: 98.8 kPa)

Size of specimen: 10 m^2

Measurement date: 2019-05-29

Measured by: Staffan Andersson



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Zilario 3 ECO Alu

SOUND ABSORPTION COEFFICIENT ACCORDING TO ISO 354 AND ISO 11654

Measurement of sound absorption coefficient in a reverberation room

Ackred. nr 10126 Provning ISO/IEC 17025

Report number: 19-727-M2

Date 2019-06-24

Frequency f [Hz]	Sound absorption coefficient α_s	α_p
50	0.01	
63	0.01	0.00
80	0.00	
100	0.03	
125	0.01	0.05
160	0.04	
200	0.06	
250	0.06	0.05
315	0.08	
400	0.13	
500	0.18	0.20
630	0.23	
800	0.29	
1000	0.30	0.30
1250	0.30	
1600	0.21	
2000	0.22	0.25
2500	0.28	
3150	0.30	
4000	0.31	0.35
5000	0.37	

α_w = 0.25

Absorption class = E

Client: Sandatex

Manufacturer: Sandatex

Product identification: Zilario 3 ECO Alu

Description of test specimen: Fabric made of 100% Recycled PET, 226 g/m^2, thickness 0.46 mm, thin coating of aluminium. Type G-100 Mounting.

Reverberation room volume: 200 m^3

Temperature: 17.0 °C (empty: 17.0 °C)

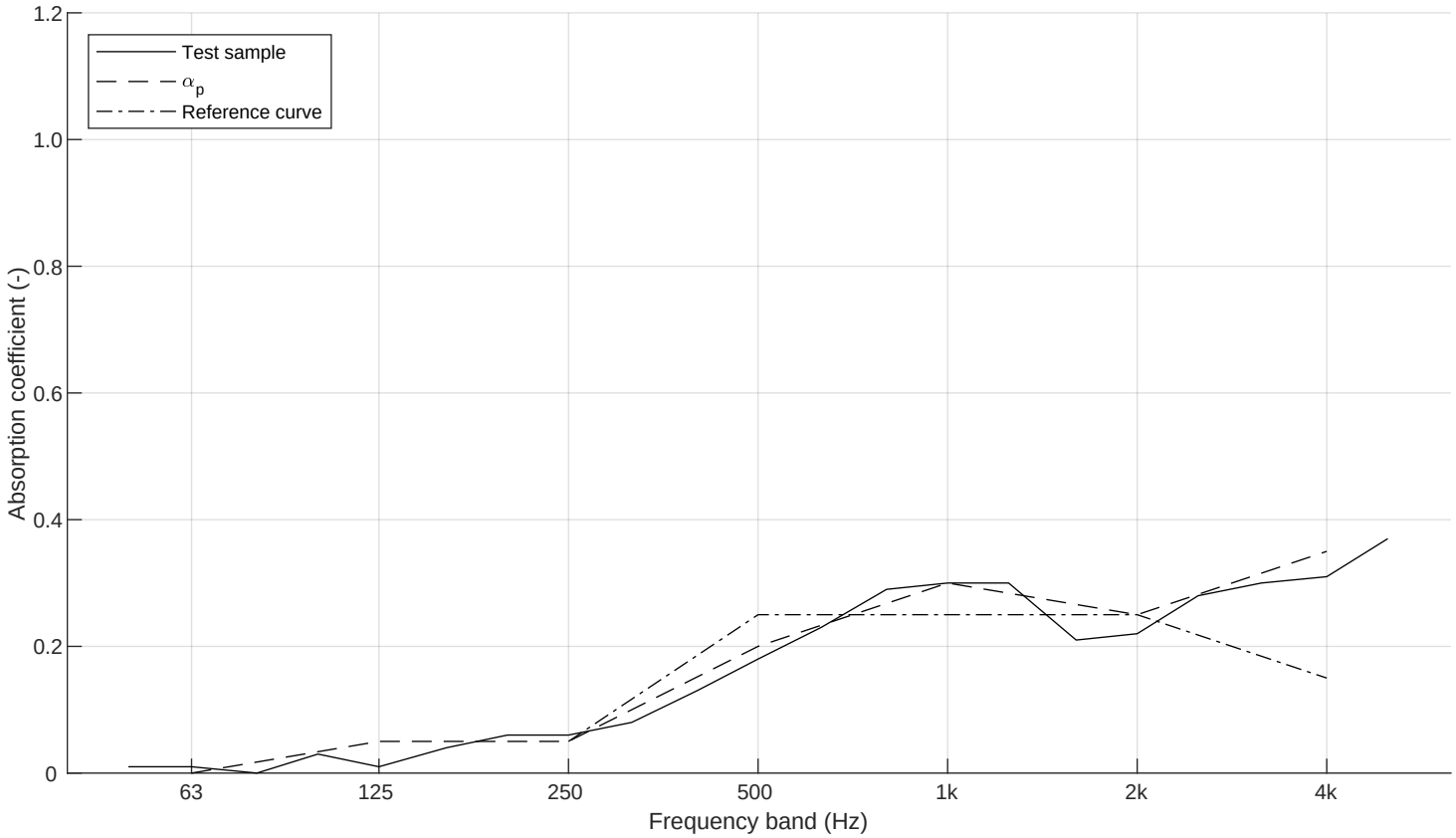
Air humidity: 46 % (empty: 51 %)

Air pressure: 98.8 kPa (empty: 98.8 kPa)

Size of specimen: 10 m^2

Measurement date: 2019-05-29

Measured by: Staffan Andersson



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Apollo BO

SOUND ABSORPTION COEFFICIENT ACCORDING TO ISO 354 AND ISO 11654

Measurement of sound absorption coefficient in a reverberation room

Report number: 19-727-M3

Date 2019-06-24

Frequency f [Hz]	Sound absorption coefficient α_s	α_p
50	0.00	
63	0.00	0.00
80	0.00	
100	0.01	
125	0.00	0.00
160	0.03	
200	0.04	
250	0.00	0.00
315	0.00	
400	0.02	
500	0.02	0.00
630	0.02	
800	0.03	
1000	0.03	0.05
1250	0.03	
1600	0.01	
2000	0.03	0.00
2500	0.02	
3150	0.04	
4000	0.06	0.05
5000	0.04	

α_w = 0.05

Absorption class =

Client: Sandatex

Manufacturer: Sandatex

Product identification: Apollo BO

Description of test specimen: Fabric made of 100% PES, 430g/m^2, thickness 0.55mm. Type G-100 Mounting.

Reverberation room volume: 200 m^3

Temperature: 17.0 °C (empty: 17.0 °C)

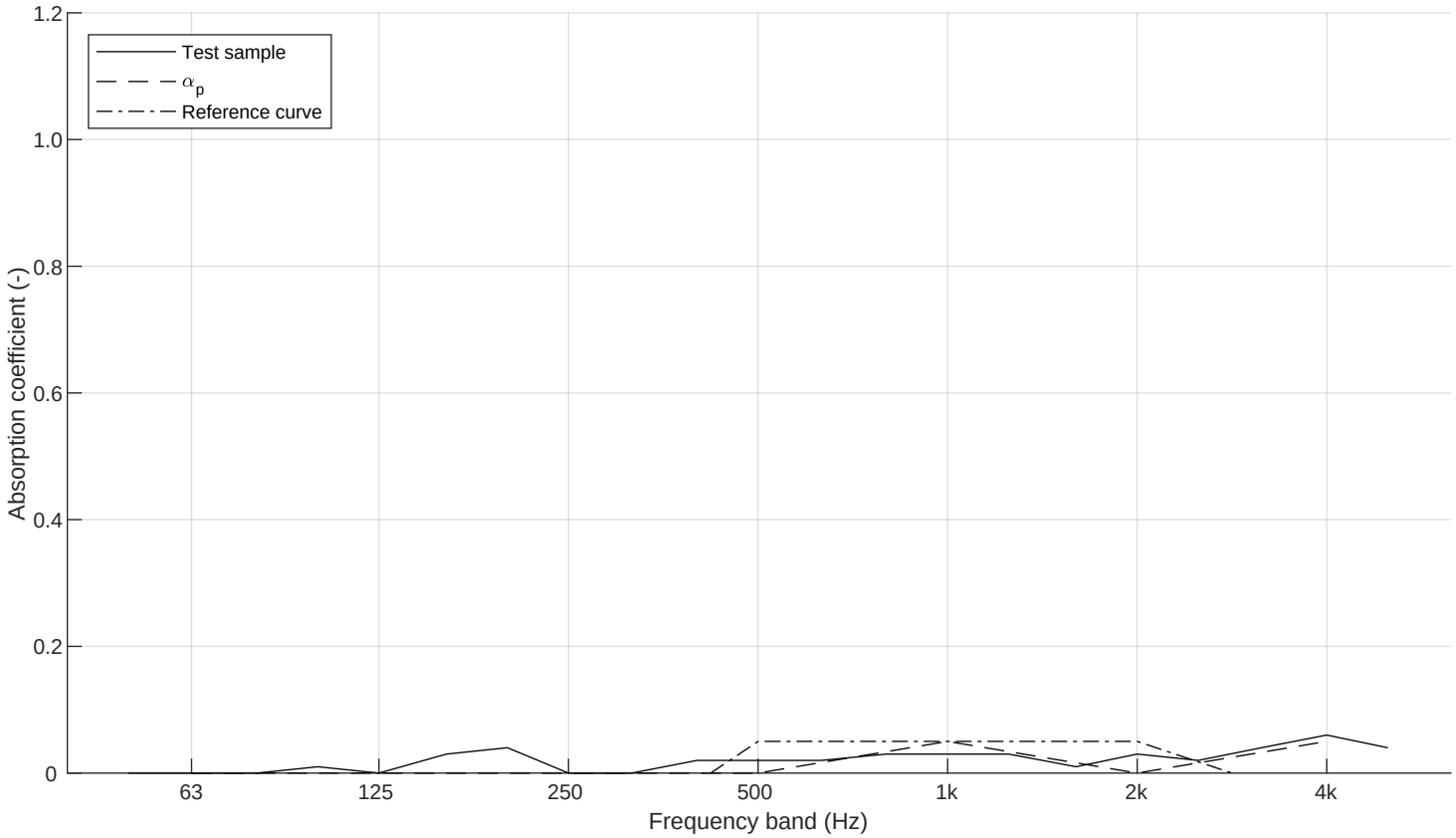
Air humidity: 46 % (empty: 51 %)

Air pressure: 98.8 kPa (empty: 98.8 kPa)

Size of specimen: 10 m^2

Measurement date: 2019-05-29

Measured by: Staffan Andersson



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Starlet

SOUND ABSORPTION COEFFICIENT ACCORDING TO ISO 354 AND ISO 11654

Measurement of sound absorption coefficient in a reverberation room

Ackred. nr 10126
Provning
ISO/IEC 17025

Report number:
19-727-M4
Date
2019-07-09

Frequency f [Hz]	Sound absorption coefficient α_s	α_p
50	0.00	
63	0.01	0.00
80	0.00	
100	0.01	
125	0.00	0.00
160	0.02	
200	0.02	
250	0.01	0.00
315	0.01	
400	0.00	
500	0.01	0.00
630	0.01	
800	0.02	
1000	0.01	0.00
1250	0.03	
1600	0.02	
2000	0.02	0.00
2500	0.03	
3150	0.04	
4000	0.07	0.05
5000	0.06	

α_w = -0.00

Absorption class =

Client: Sandatex

Manufacturer: Sandatex

Product identification: Starlet

Description of test specimen: Fabric made of 100% Recycled PET, 215 g/m^2, thickness 0.35 mm. Type G-100 Mounting.

Reverberation room volume: 200 m^3

Temperature: 17.0 °C (empty: 17.0 °C)

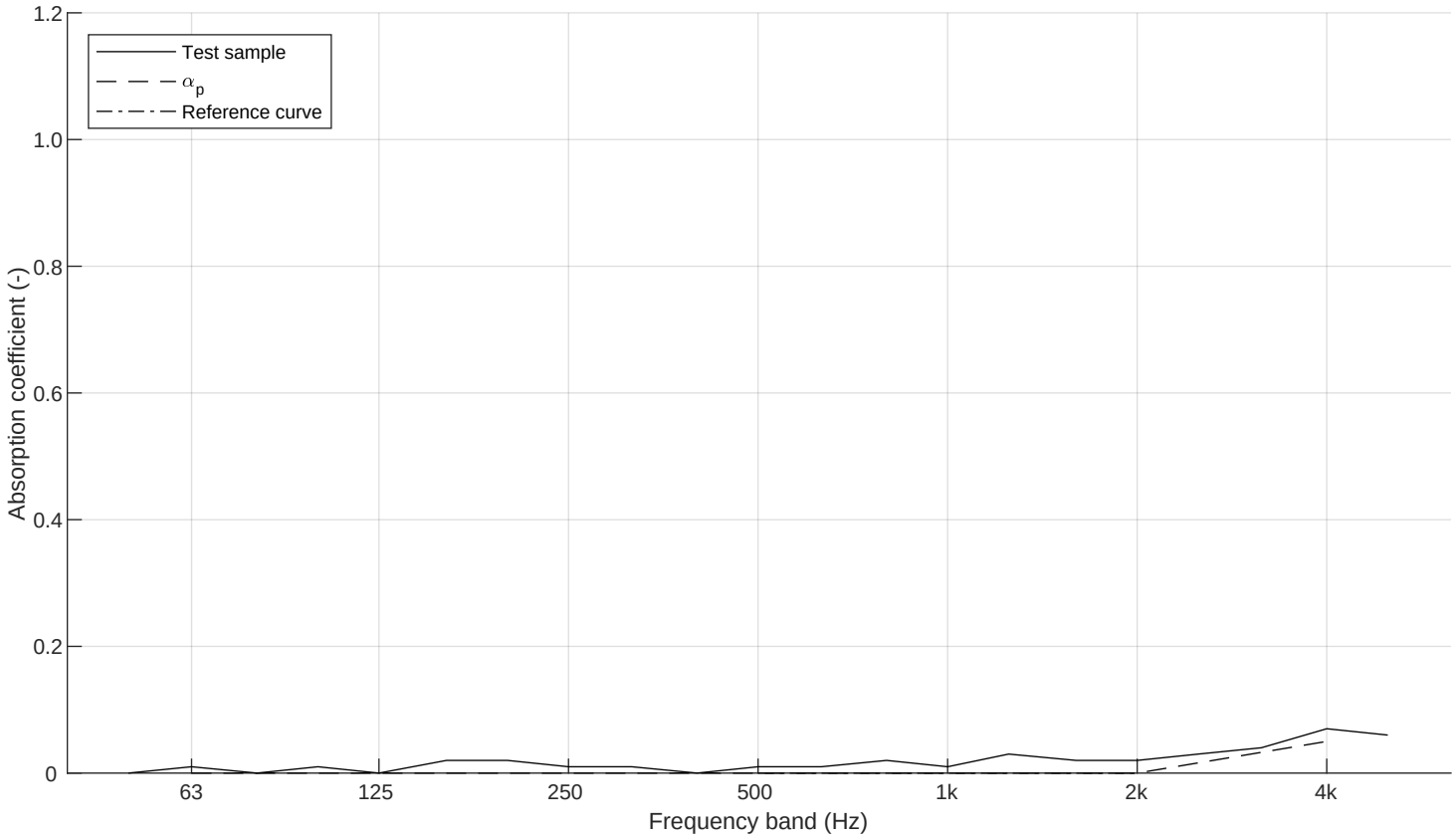
Air humidity: 47 % (empty: 51 %)

Air pressure: 98.8 kPa (empty: 98.8 kPa)

Size of specimen: 10 m^2

Measurement date: 2019-05-29

Measured by: Staffan Andersson



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Skyscreen Alu

SOUND ABSORPTION COEFFICIENT ACCORDING TO ISO 354 AND ISO 11654

Measurement of sound absorption coefficient in a reverberation room

Report number: 19-727-M5

Date 2019-06-24

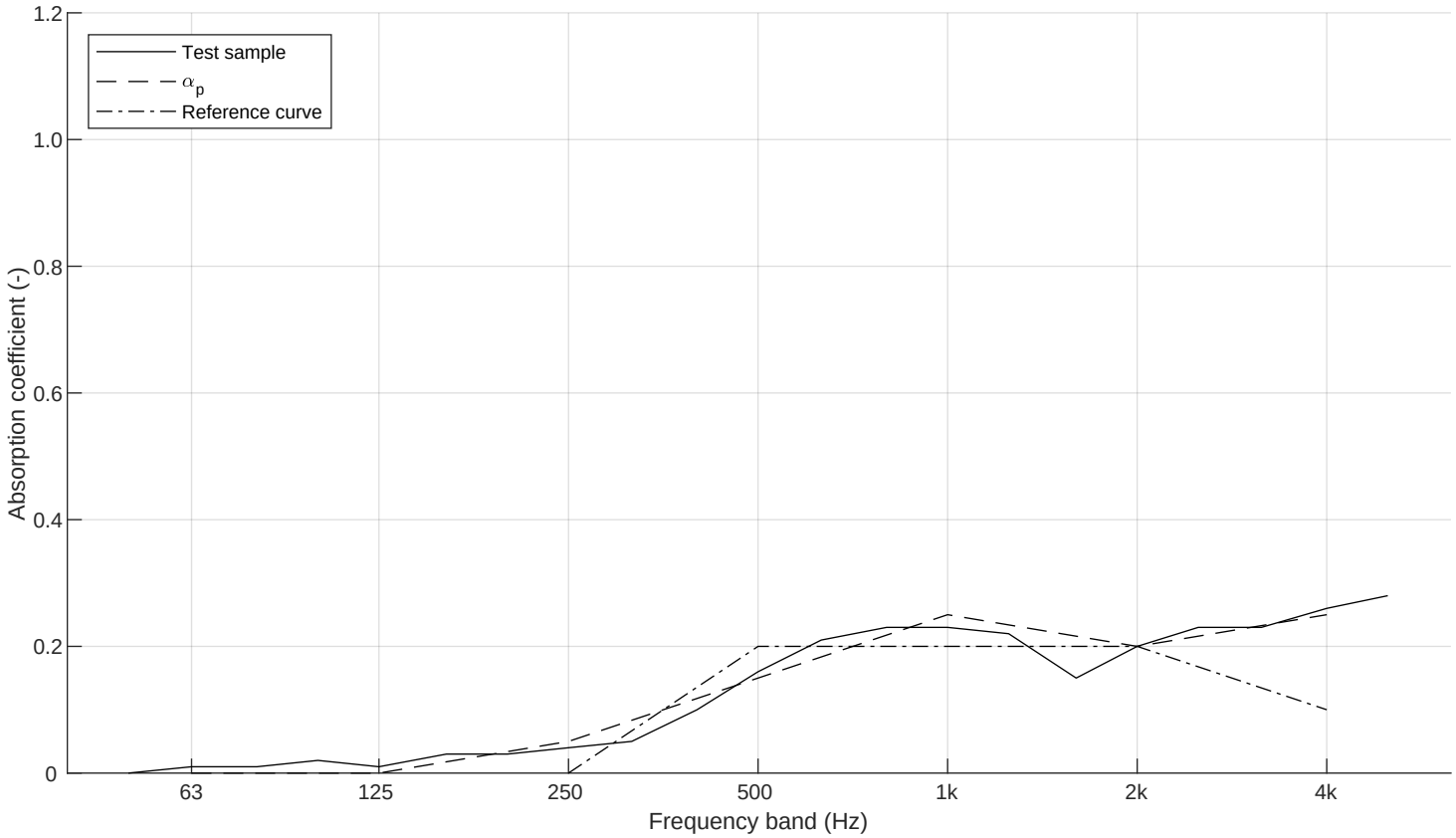
Frequency f [Hz]	Sound absorption coefficient α_s	α_p
50	0.00	
63	0.01	0.00
80	0.01	
100	0.02	
125	0.01	0.00
160	0.03	
200	0.03	
250	0.04	0.05
315	0.05	
400	0.10	
500	0.16	0.15
630	0.21	
800	0.23	
1000	0.23	0.25
1250	0.22	
1600	0.15	
2000	0.20	0.20
2500	0.23	
3150	0.23	
4000	0.26	0.25
5000	0.28	

α_w = 0.20

Absorption class = E

Client:	Sandatex
Manufacturer:	Sandatex
Product identification:	Skyscreen Alu
Description of test specimen:	Fabric made of 100% PES, 260 g/m^2, thickness 0.37 mm, thin coating of aluminium. Type G-100 Mounting.

Reverberation room volume:	200 m^3		
Temperature:	17.0 °C	(empty:	17.0 °C)
Air humidity:	46 %	(empty:	51 %)
Air pressure:	98.8 kPa	(empty:	98.8 kPa)
Size of specimen:	10 m^2		
Measurement date:	2019-05-29		
Measured by:	Staffan Andersson		



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