Akustikverkstan Lab AB
Kinnegatan 23, 531 33 Lidköping, tel: 0510 - 911 44

joachim.schubert@akustikverkstan.se
Direkt: 072 - 164 70 24

ABSORPTION MEASUREMENTS AND INTERPOLATIONS FOR ABSORBA TABLE SCREEN 30 FROM DECIBEL BY JOHANSON

CONCLUSIONS

The sound absorption has been measured for three Absorba Table Screen 30 from Decibel by Johansson according to the reverberation room method ISO 354:2003. The measurements have been evaluated according to ISO 20189:2018.

Sound absorption for seven desk screens in the same product series has been calculated according to ISO 20189:2018 based on the measured results.

N_{10}-values as defined by *Kammarkollegiet,* the Swedish authority dealing with public purchasing, are given for the measured and calculated products in tables 1 and 2 below.

Measurement protocol	Test object	N_{10}
M5	Absorba Table Screen 30, 600 x 800	21
M6	Absorba Table Screen 30, 850 x 1200	9.6
M7	Absorba Table Screen 30, 850 x 1800	6.7

Table 1: N_{10}-value and reference to measurement protocols for the measured products.

Calculation protocol	Test object	N_{10}
M8	Absorba Table Screen 30, 850 x 800	14
M9	Absorba Table Screen 30, 600 x 1200	14
M10	Absorba Table Screen 30, 600 x 1400	12
M11	Absorba Table Screen 30, 600 x 1600	10
M12	Absorba Table Screen 30, 600 x 1800	9.2
M13	Absorba Table Screen 30, 850 x 1400	8.4
M14	Absorba Table Screen 30, 850 x 1600	7.4

Table 2: N_{10}-value and reference to calculation protocols for the interpolated products.

Detailed measurement results of sound absorption area are presented in the separate measurement protocols 3333-M5 to M7.

Detailed calculated results of sound absorption area are presented in the separate calculation protocols 3333-M8 to M14.

1 CLIENT

Decibel by Johansson, Anders Anderssons väg 7, 285 35 Markaryd, Sweden
Contact: Per Kentner, +46 (0)433 7251, per.kentner@johansondesign.se

2 ASSIGNMENT

To measure the sound absorption area for three Absorba Table Screen 30 from Decibel by Johansson according to the reverberation room method ISO 354:2003 and evaluate according to ISO 20189:2018. The assignment also includes to calculate the sound absorption area for seven additional screens in the same product series according to the interpolation method described in ISO 20189:2018. The interpolation is based on the measured results.

3 TEST OBJECTS

Absorba Table screen 30 is made of a slim 25 mm thick wooden frame filled with a 20 mm thick Ecophon glass fiber sound absorber covered by a 5 mm thick polyester wadding and a fabric.
The total thickness was measured to 30 mm. The table screens include a horizontal wooden board as support for the table fixtures.

The available heights are 600 mm and 850 mm. The available widths are 800 mm, 1200 mm, 1400 mm, 1600 mm, and 1800 mm. Dimensions of the tested objects are given in table 3.

Test object name from client	Height (mm)	Width (mm)	Weight (kg)	Measurement protocol
Absorba Table Screen 30, 600 x 800	605	805	2.6	M5
Absorba Table Screen 30, 850 x 1200	855	1205	4.3	M6
Absorba Table Screen 30, 850 x 1800	850	1800	6.7	M7

Table 3: Tested objects with measured dimensions and weight.

The test objects are shown in figures 1 to 3.

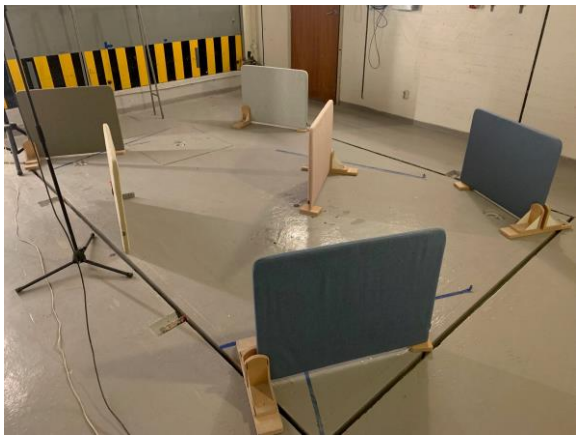


Figure 1. Absorba Table Screen 30, 600 x 800 mm (3333-M5).

Figure 2. Absorba Table Screen 30, 850 x 1200 mm (3333-M6).

Figure 3. Absorba Table Screen 30, 850 x 1800 mm (3333-M7).

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 area were evaluated according to ISO 20189:2018.

The measurements were performed by Joachim Schubert 2024-01-22 in Akustikverkstan's reverberation room in Skultorp, Skövde, Sweden. More information on the test facilities can be found in Appendix 2.

5 CALCULATION METHOD

Calculations has been made for seven additional table screens based on measurements 3333-M5 to 3333-M7. The calculation of sound absorption area according to ISO 20189:2018, appendix E, is made by a linear interpolation of measurement results from one bigger and one smaller object and are based on the differences in object areas.

The references to the used measurements including object sizes are found on each calculation protocol attached to this report.

6 RESULTS

Measurements result as N_{10}-values are given in table 1 and calculated results as N_{10}-values are given in table 2.

Detailed measurement results for all test objects are available in the measurement protocols 3333-M5 to 3333-M7 attached as appendices to this report. The results are only valid for the tested sample.

Detailed calculated results for the interpolated products are available in calculation protocols 3333-M8 to 3333-M14.

7 COMMENTS AND INTERPRETATIONS

N_{10}-values

Kammarkollegiet, the Swedish authority dealing with public purchasing, has published advice regarding purchasing of sound absorbers.

They define the value N_{10} according to the formula:

$$N_{10} = \frac{10}{A_{500}}$$

A_{500} is the average of the sound absorption area for the three 1/3 octave bands within the 500 Hz octave band for the sound absorber. The N_{10} value is developed to be a single value metric for speech sound absorption and describes how many objects are needed to obtain 10 m^2 of sound absorption area in the 500 Hz octave band. If the sound absorption is lower in any octave above 500 Hz, the lower value will be used instead.

8 DEVIATIONS FROM THE STANDARD

According to ISO 20189:2018, the total sound absorption area in 1/3 octave bands should be reported with one decimal. The measurement protocols belonging to this report include two decimals.

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

Joachim Schubert

Reviewed by Carl Nyqvist, 2024-01-25

APPENDIX 1: MEASURED REVERBERATION TIMES

f(Hz)	Empty room	M5: Absorba Table Screen 30, 600 x 800	M6 Absorba Table Screen 30, 850 x 1200	M7: Absorba Table Screen 30, 850 x 1800
50	8.10	7.42	6.93	6.74
63	8.84	7.92	7.52	7.64
80	8.17	7.12	7.01	7.13
100	7.29	6.26	6.18	6.29
125	7.15	5.89	5.48	5.59
160	5.86	4.74	4.48	4.53
200	5.57	4.17	4.28	4.31
250	5.52	4.09	4.04	4.08
315	5.63	3.98	3.95	3.95
400	5.27	3.80	3.79	3.83
500	4.94	3.37	3.25	3.31
630	4.33	3.01	2.94	2.96
800	4.68	3.02	3.00	2.91
1000	4.63	2.87	2.84	2.84
1250	4.05	2.65	2.62	2.56
1600	3.65	2.42	2.41	2.37
2000	3.22	2.19	2.19	2.23
2500	2.80	2.03	1.99	2.01
3150	2.34	1.74	1.73	1.78
4000	1.91	1.51	1.49	1.51
5000	1.51	1.28	1.26	1.25

Number of objects	0	6	3	2
Temperature (°C)	15.9	16.4	16.3	16.1
RH (%)	42	43	43	42

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 A2.1. The mounting area consists of a concrete slab that can be lowered up to 700 mm below the floor.

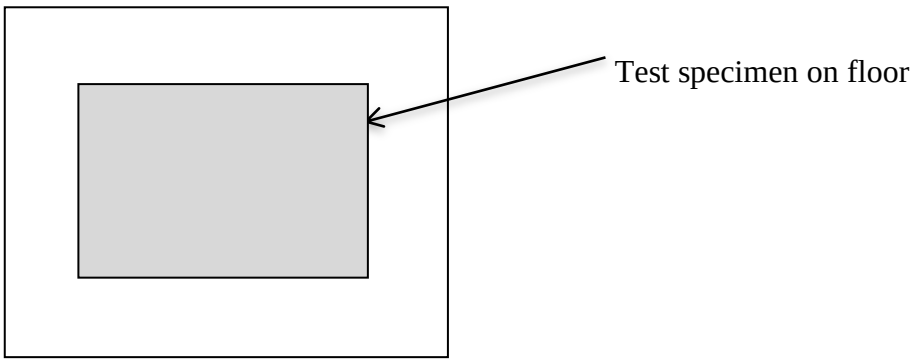


Figure A2.1: Plane drawing of the reverberation room with the positions of the test specimens.

APPENDIX 3: MEASUREMENT EQUIPMENT

Table A3.1 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 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 A3.1: Equipment used during the measurements.

APPENDIX 4: MEASUREMENT UNCERTAINTY

The uncertainties in the measured sound absorption coefficients have been estimated to the values in table A4.1. 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 A4.1: Measurement uncertainty for each third octave.

Absorba Table Screen 30, 600 x 800

SOUND ABSORPTION AREA ACCORDING TO SS-EN ISO 354:2003 and ISO 20189:2018

Measurement of sound absorption area in a reverberation room

Ackred. nr. 10445
Provning
ISO/IEC 17025

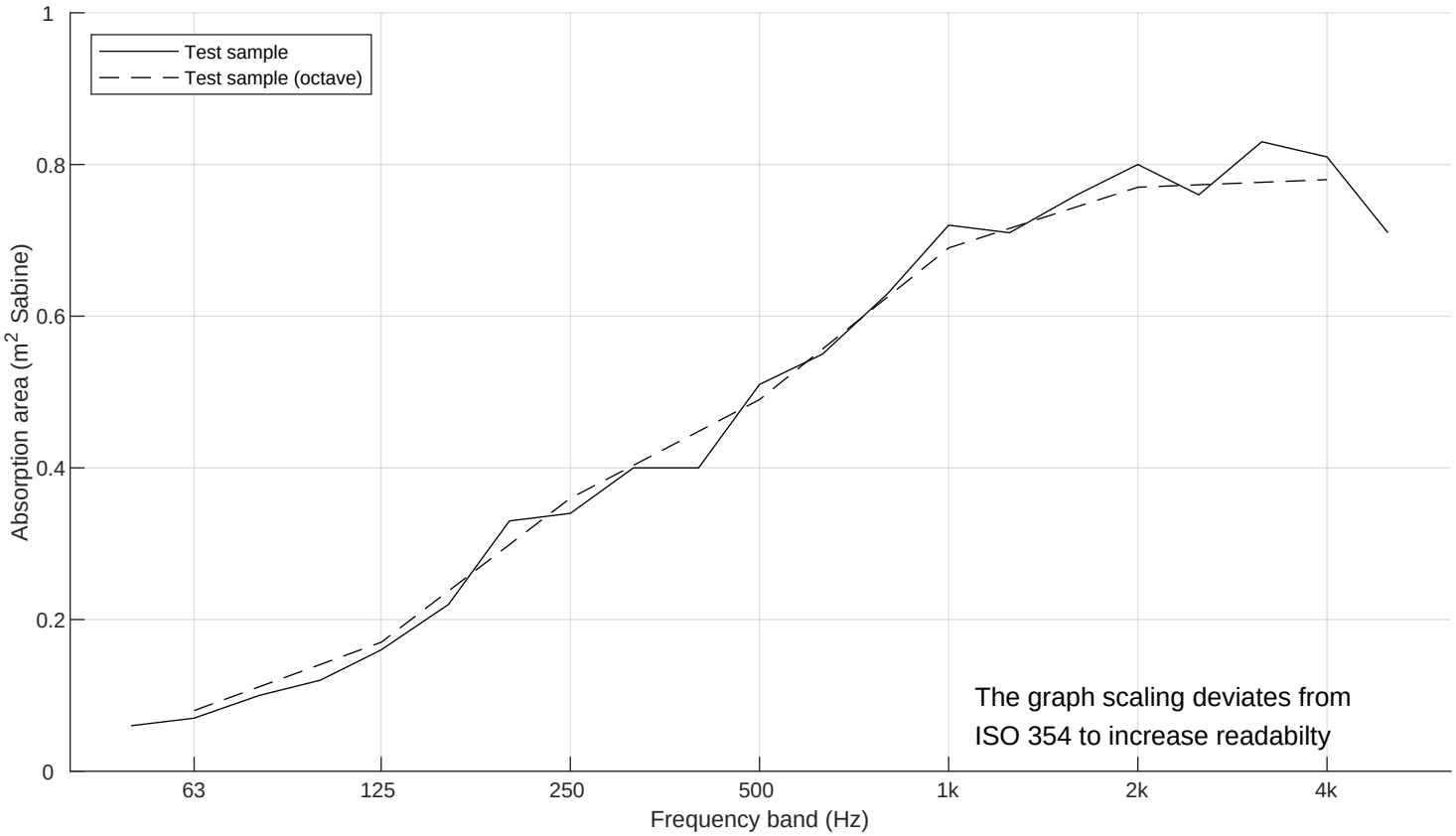
Report number:
3333-M5
Date
2024-01-24

Frequency f [Hz]	Sound absorption area per object [m^2 Sabine]	
50	0.06	
63	0.07	0.08
80	0.10	
100	0.12	
125	0.16	0.17
160	0.22	
200	0.33	
250	0.34	0.36
315	0.40	
400	0.40	
500	0.51	0.49
630	0.55	
800	0.63	
1000	0.72	0.69
1250	0.71	
1600	0.76	
2000	0.80	0.77
2500	0.76	
3150	0.83	
4000	0.81	0.78
5000	0.71	

N_{10} = 21

Client:	Decibel By Johansson
Manufacturer:	Decibel By Johansson
Product identification:	Absorba Table Screen 30, 600 x 800
Description of test specimen:	Table screen made of a wooden frame with Ecophon filling covered with polyester wadding and fabric. Nominal dimensions: 600 x 800 x 30 mm. Tested standing on the floor.

Reverberation room volume:			200 m^3
Temperature:	16.4 °C	(empty:	15.9 °C)
Air humidity:	43 %	(empty:	42 %)
Air pressure:	96.0 kPa	(empty:	96.0 kPa)
Number of objects:	6		
Measurement date:			2024-01-22
Measured by:			Joachim Schubert



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RT20240122_1519_tom_efter.mat
RT20240122_1445_Decibel_skarm_800x600.mat

Absorba Table Screen 30, 850 x 1200

SOUND ABSORPTION AREA ACCORDING TO SS-EN ISO 354:2003 and ISO 20189:2018

Measurement of sound absorption area in a reverberation room

Ackred. nr. 10445
Provning
ISO/IEC 17025

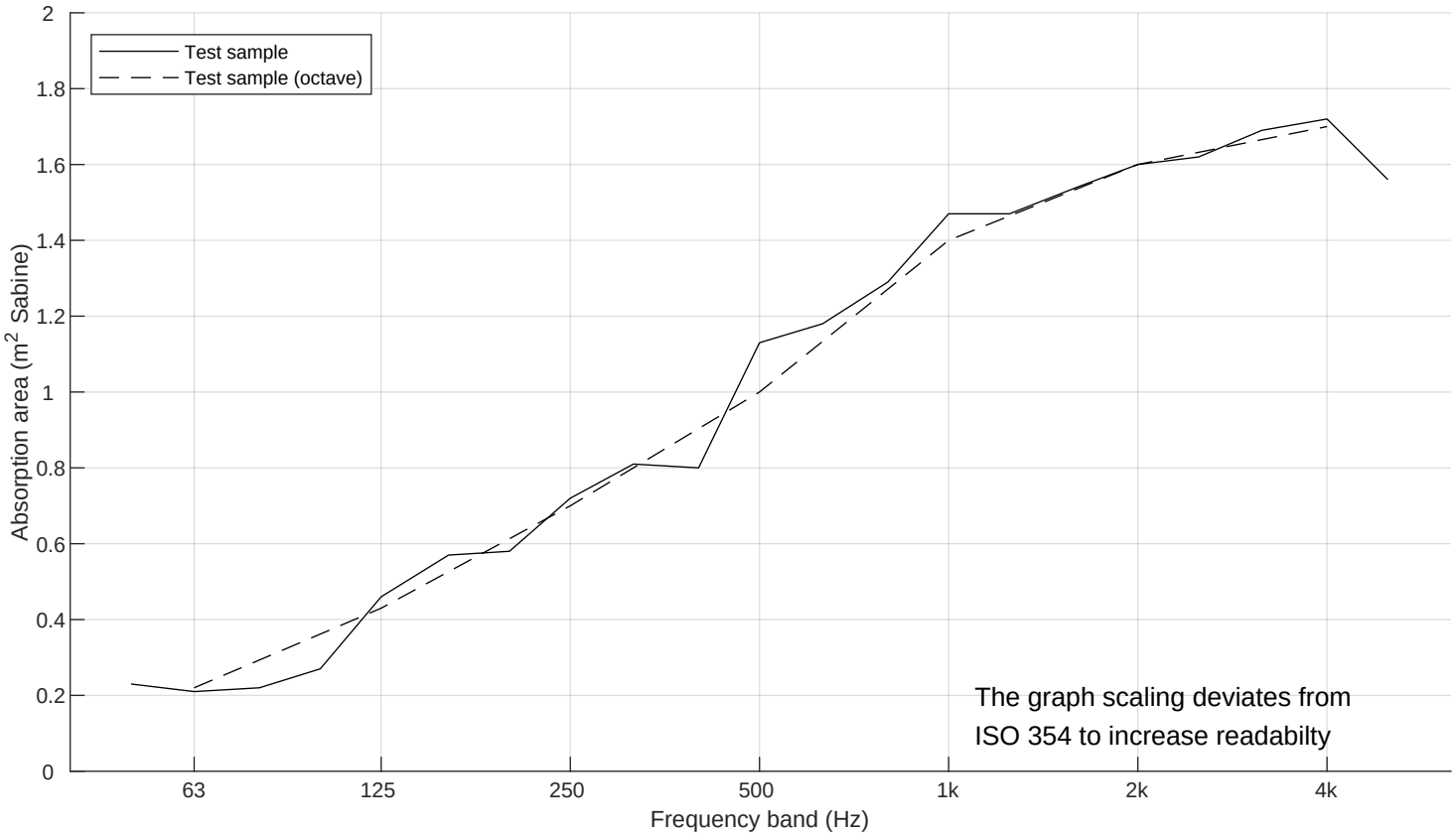
Report number:
3333-M6
Date
2024-01-24

Frequency f [Hz]	Sound absorption area per object [m^2 Sabine]	
50	0.23	
63	0.21	0.22
80	0.22	
100	0.27	
125	0.46	0.43
160	0.57	
200	0.58	
250	0.72	0.70
315	0.81	
400	0.80	
500	1.13	1.0
630	1.18	
800	1.29	
1000	1.47	1.4
1250	1.47	
1600	1.54	
2000	1.60	1.6
2500	1.62	
3150	1.69	
4000	1.72	1.7
5000	1.56	

N_{10} = 9.6

Client:	Decibel By Johansson
Manufacturer:	Decibel By Johansson
Product identification:	Absorba Table Screen 30, 850 x 1200
Description of test specimen:	Table screen made of a wooden frame with Ecophon filling covered with polyester wadding and fabric. Nominal dimensions: 850 x 1200 x 30 mm. Tested standing on the floor.

Reverberation room volume:	200 m^3		
Temperature:	16.3 °C	(empty:	15.9 °C)
Air humidity:	43 %	(empty:	42 %)
Air pressure:	96.0 kPa	(empty:	96.0 kPa)
Number of objects:	3		
Measurement date:	2024-01-22		
Measured by:	Joachim Schubert		



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RT20240122_1519_tom_efter.mat
RT20240122_1458_Decibel_skarm_1200x850.mat

Absorba Table Screen 30, 850 x 1800

SOUND ABSORPTION AREA ACCORDING TO SS-EN ISO 354:2003 and ISO 20189:2018

Measurement of sound absorption area in a reverberation room

Ackred. nr. 10445
Provning
ISO/IEC 17025

Report number:
3333-M7
Date
2024-01-24

Frequency f [Hz]	Sound absorption area per object [m^2 Sabine]	
50	0.40	
63	0.29	0.33
80	0.29	
100	0.35	
125	0.63	0.60
160	0.81	
200	0.85	
250	1.03	1.0
315	1.22	
400	1.16	
500	1.61	1.5
630	1.74	
800	2.11	
1000	2.21	2.2
1250	2.35	
1600	2.40	
2000	2.25	2.3
2500	2.28	
3150	2.21	
4000	2.30	2.2
5000	2.23	

N_{10} = 6.7

Client: Decibel By Johansson

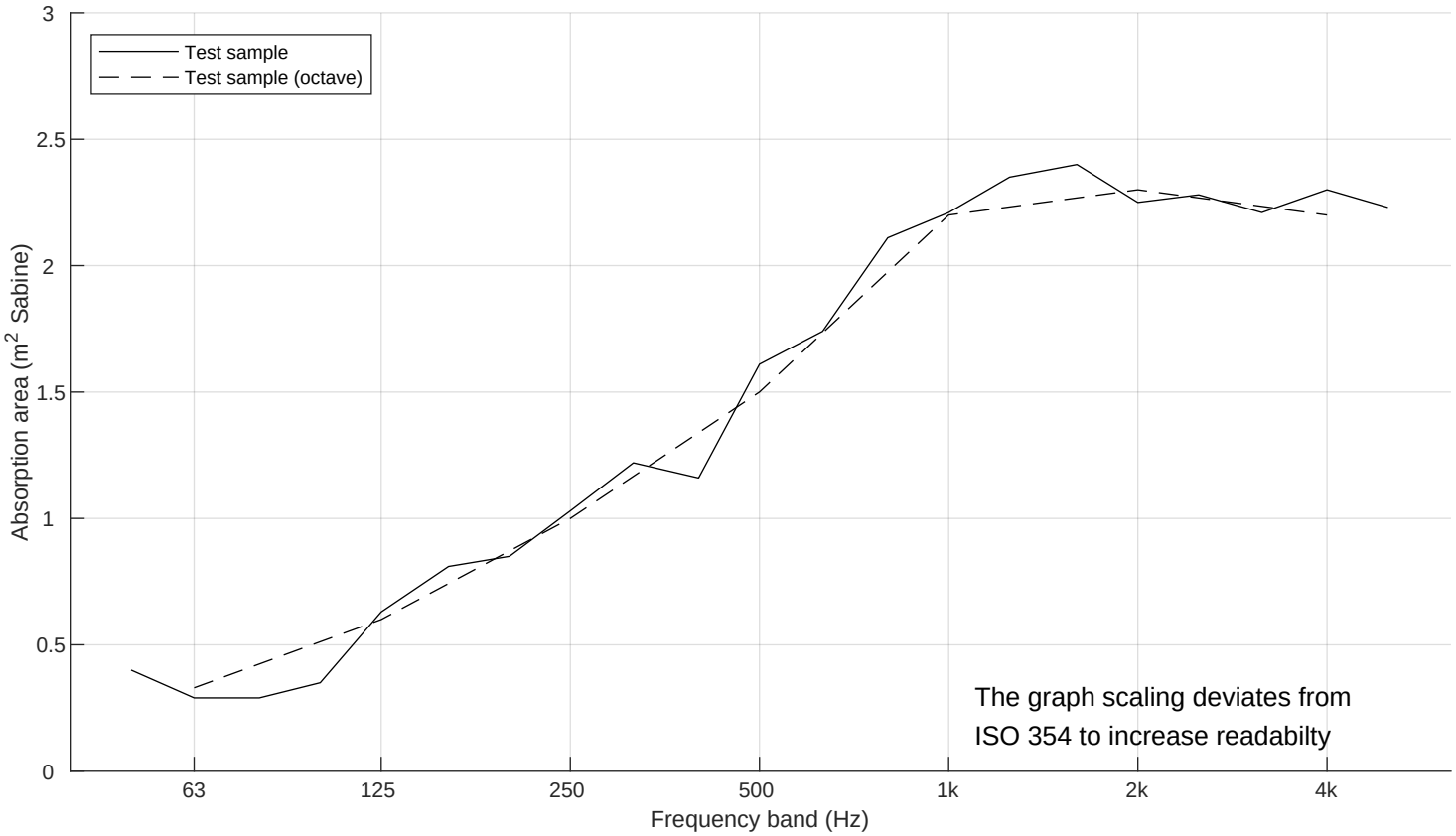
Manufacturer: Decibel By Johansson

Product identification: Absorba Table Screen 30, 850 x 1800

Description of test specimen: Table screen made of a wooden frame with Ecophon filling covered with polyester wadding and fabric.
Nominal dimensions: 850 x 1800 x 30 mm. Tested standing on the floor.

Reverberation room volume: 200 m^3
Temperature: 16.1 °C (empty: 15.9 °C)
Air humidity: 42 % (empty: 42 %)
Air pressure: 96.0 kPa (empty: 96.0 kPa)
Number of objects: 2

Measurement date: 2024-01-22
Measured by: Joachim Schubert



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RT20240122_1519_tom_efter.mat
RT20240122_1510_Decibel_skarm_1800x850.mat

Absorba Table Screen 30, 850 x 800

SOUND ABSORPTION AREA - CALCULATED FROM MEASUREMENTS

Calculated sound absorption area from ISO 354:2003 reverberation room measurements, evaluated according to ISO 20189:2018

Ackred. nr. 10445
Provning
ISO/IEC 17025

Report number:
3333-M8
Date
2024-01-24

Frequency f [Hz]	Sound absorption area per object [m² Sabine]	
50	0.12	
63	0.12	0.13
80	0.14	
100	0.18	
125	0.27	0.27
160	0.35	
200	0.42	
250	0.48	0.48
315	0.55	
400	0.55	
500	0.74	0.69
630	0.78	
800	0.87	
1000	1.00	0.95
1250	0.99	
1600	1.05	
2000	1.10	1.1
2500	1.08	
3150	1.15	
4000	1.15	1.1
5000	1.02	

N_{10} = 14

Client: Decibel By Johansson

Manufacturer: Decibel By Johansson

Product identification: Absorba Table Screen 30, 850 x 800

Description of test specimen: Table screen made of a wooden frame with Ecophon filling covered with polyester wadding and fabric.
Nominal dimensions: 850 x 800 x 30 mm.

Interpolation according to ISO 20189:2018 appendix E, based on measurements:

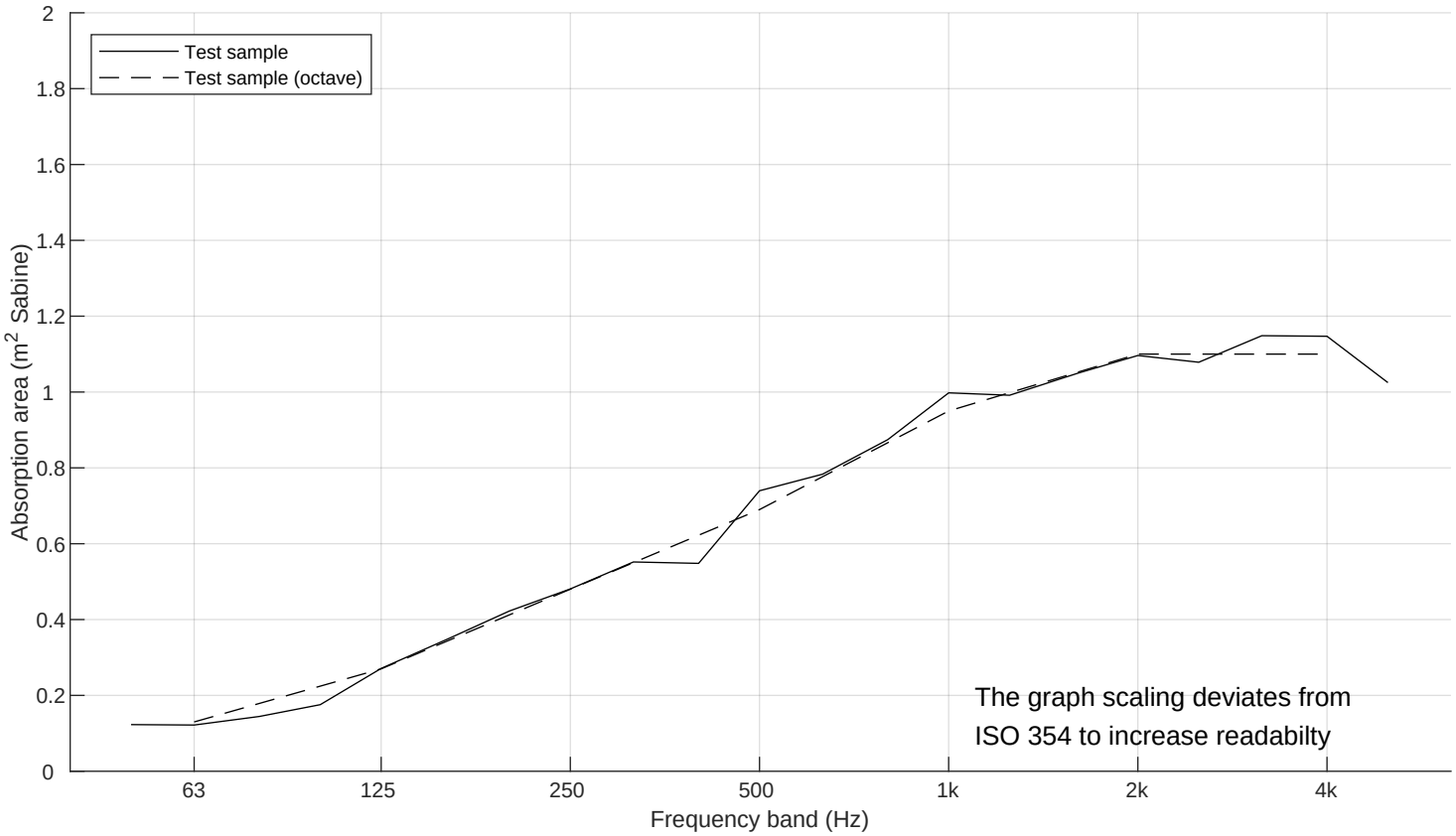
3333-M5.txt

and

3333-M6.txt

	Height	Width
Object 1 size	600	800
Object 2 size	850	1200
Interpolated object size	850	800

Area difference 29 %



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Absorba Table Screen 30, 600 x 1200

SOUND ABSORPTION AREA - CALCULATED FROM MEASUREMENTS

Calculated sound absorption area from ISO 354:2003 reverberation room measurements, evaluated according to ISO 20189:2018

Ackred. nr. 10445
Provning
ISO/IEC 17025

Report number:
3333-M9
Date
2024-01-24

Frequency f [Hz]	Sound absorption area per object [m² Sabine]	
50	0.14	
63	0.13	0.14
80	0.15	
100	0.19	
125	0.29	0.29
160	0.38	
200	0.44	
250	0.51	0.51
315	0.58	
400	0.58	
500	0.79	0.73
630	0.83	
800	0.92	
1000	1.05	1.0
1250	1.05	
1600	1.11	
2000	1.16	1.1
2500	1.14	
3150	1.21	
4000	1.21	1.2
5000	1.09	

N_{10} = 14

Client: Decibel By Johansson

Manufacturer: Decibel By Johansson

Product identification: Absorba Table Screen 30, 600 x 1200

Description of test specimen: Table screen made of a wooden frame with Ecophon filling covered with polyester wadding and fabric.
Nominal dimensions: 600 x 1200 x 30 mm.

Interpolation according to ISO 20189:2018 appendix E, based on measurements:

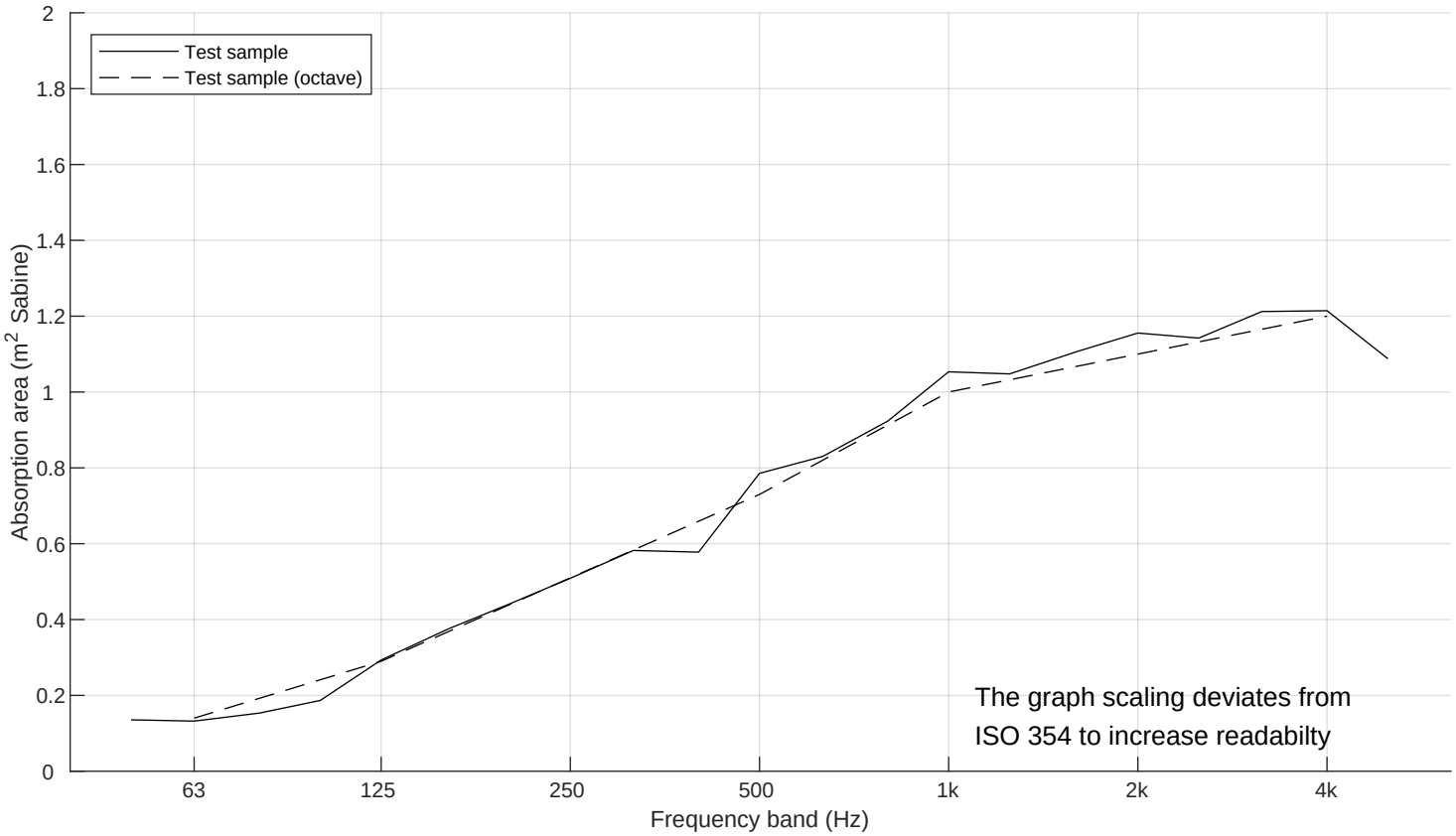
3333-M5.txt

and

3333-M6.txt

	Height	Width
Object 1 size	600	800
Object 2 size	850	1200
Interpolated object size	600	1200

Area difference 29 %



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Absorba Table Screen 30, 600 x 1400

SOUND ABSORPTION AREA - CALCULATED FROM MEASUREMENTS

Calculated sound absorption area from ISO 354:2003 reverberation room measurements, evaluated according to ISO 20189:2018

Ackred. nr. 10445
Provning
ISO/IEC 17025

Report number:
3333-M10
Date
2024-01-24

Frequency f [Hz]	Sound absorption area per object [m² Sabine]	
50	0.17	
63	0.16	0.17
80	0.18	
100	0.22	
125	0.36	0.34
160	0.45	
200	0.50	
250	0.59	0.59
315	0.67	
400	0.67	
500	0.92	0.85
630	0.97	
800	1.07	
1000	1.22	1.2
1250	1.22	
1600	1.28	
2000	1.33	1.3
2500	1.33	
3150	1.40	
4000	1.42	1.4
5000	1.28	

N_{10} = 12

Client: Decibel By Johansson

Manufacturer: Decibel By Johansson

Product identification: Absorba Table Screen 30, 600 x 1400

Description of test specimen: Table screen made of a wooden frame with Ecophon filling covered with polyester wadding and fabric.
Nominal dimensions: 600 x 1400 x 30 mm.

Interpolation according to ISO 20189:2018 appendix E, based on measurements:

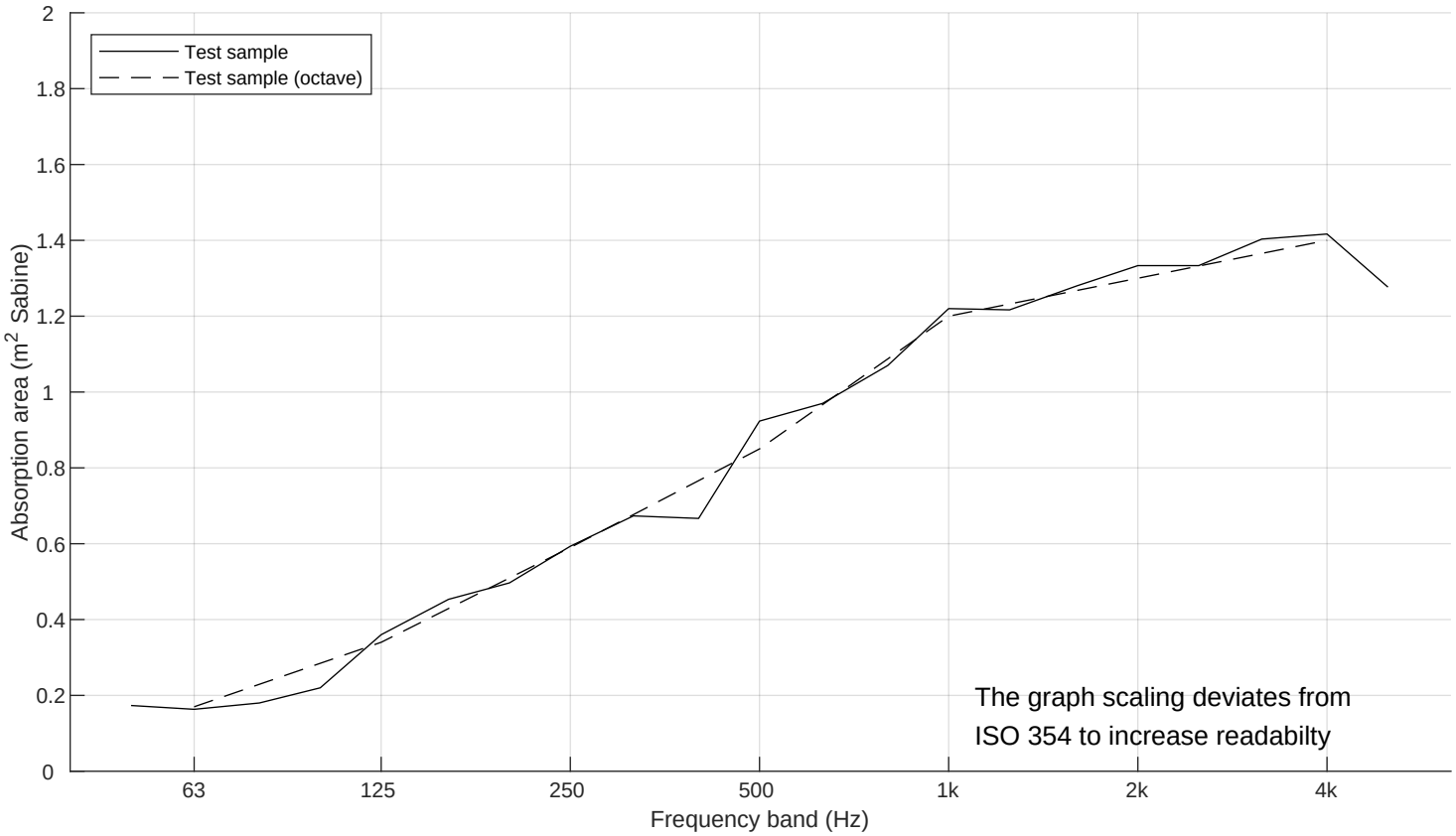
3333-M5.txt

and

3333-M6.txt

	Height	Width
Object 1 size	600	800
Object 2 size	850	1200
Interpolated object size	600	1400

Area difference 18 %



AKUSTIKVERKSTAN

Absorba Table Screen 30, 600 x 1600

SOUND ABSORPTION AREA - CALCULATED FROM MEASUREMENTS

Calculated sound absorption area from ISO 354:2003 reverberation room measurements, evaluated according to ISO 20189:2018

Report number: 3333-M11

Date 2024-01-24

Frequency f [Hz]	Sound absorption area per object [m² Sabine]	
50	0.21	
63	0.19	0.20
80	0.21	
100	0.25	
125	0.43	0.40
160	0.53	
200	0.55	
250	0.68	0.66
315	0.76	
400	0.76	
500	1.06	0.98
630	1.11	
800	1.22	
1000	1.39	1.3
1250	1.39	
1600	1.45	
2000	1.51	1.5
2500	1.52	
3150	1.59	
4000	1.62	1.6
5000	1.47	

N_{10} = 10

Client: Decibel By Johansson

Manufacturer: Decibel By Johansson

Product identification: Absorba Table Screen 30, 600 x 1600

Description of test specimen: Table screen made of a wooden frame with Ecophon filling covered with polyester wadding and fabric.
Nominal dimensions: 600 x 1600 x 30 mm.

Interpolation according to ISO 20189:2018 appendix E, based on measurements:

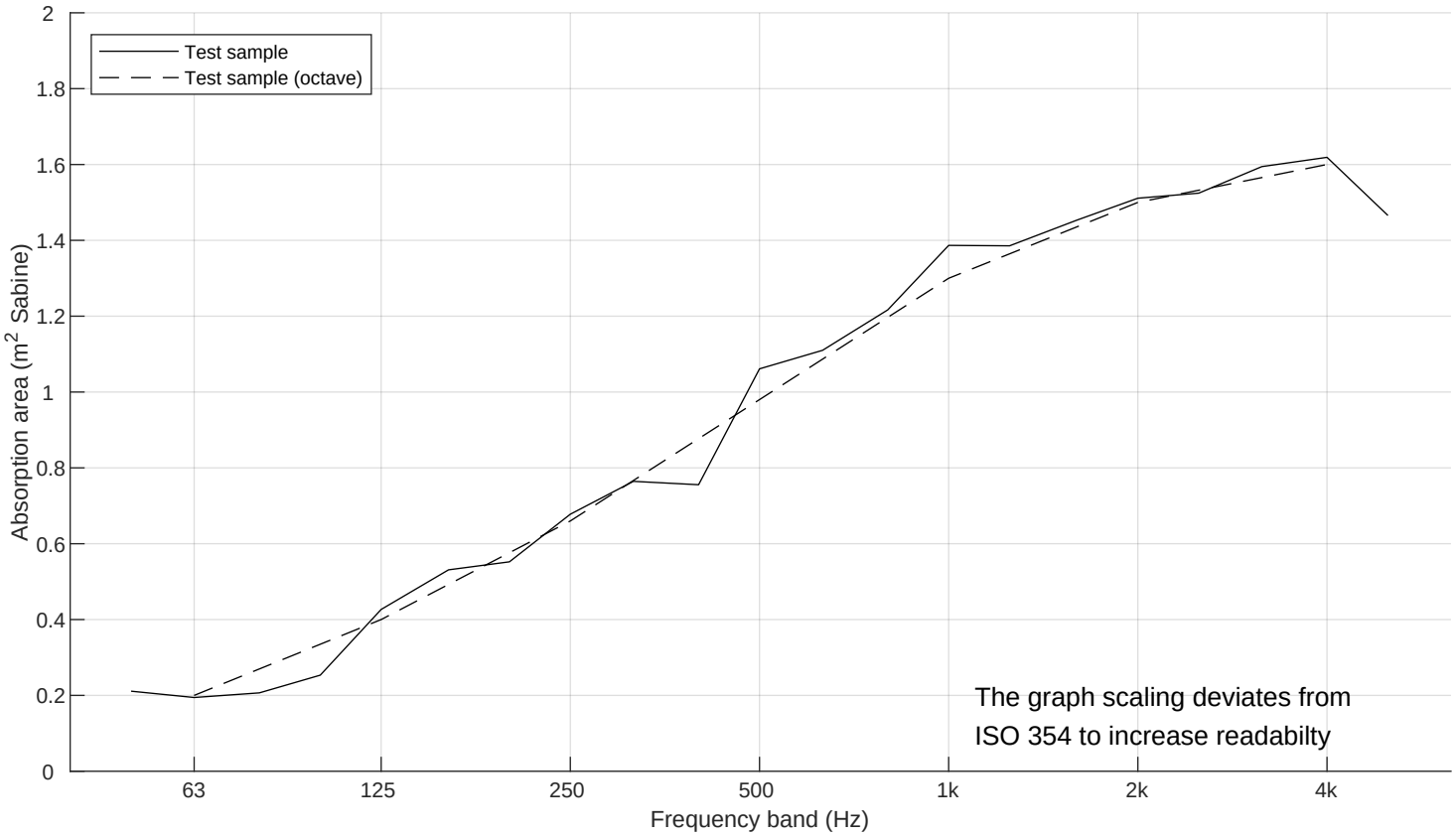
3333-M5.txt

and

3333-M6.txt

	Height	Width
Object 1 size	600	800
Object 2 size	850	1200
Interpolated object size	600	1600

Area difference 6 %



AKUSTIKVERKSTAN

Absorba Table Screen 30, 600 x 1800

SOUND ABSORPTION AREA - CALCULATED FROM MEASUREMENTS

Calculated sound absorption area from ISO 354:2003 reverberation room measurements, evaluated according to ISO 20189:2018

Ackred. nr. 10445
Provning
ISO/IEC 17025

Report number:
3333-M12
Date
2024-01-24

Frequency f [Hz]	Sound absorption area per object [m² Sabine]	
50	0.25	
63	0.22	0.23
80	0.23	
100	0.28	
125	0.48	0.45
160	0.60	
200	0.61	
250	0.76	0.74
315	0.86	
400	0.84	
500	1.19	1.1
630	1.25	
800	1.39	
1000	1.56	1.5
1250	1.57	
1600	1.64	
2000	1.68	1.7
2500	1.70	
3150	1.75	
4000	1.79	1.7
5000	1.64	

N_{10} = 9.2

Client: Decibel By Johansson

Manufacturer: Decibel By Johansson

Product identification: Absorba Table Screen 30, 600 x 1800

Description of test specimen: Table screen made of a wooden frame with Ecophon filling covered with polyester wadding and fabric.
Nominal dimensions: 600 x 1800 x 30 mm.

Interpolation according to ISO 20189:2018 appendix E, based on measurements:

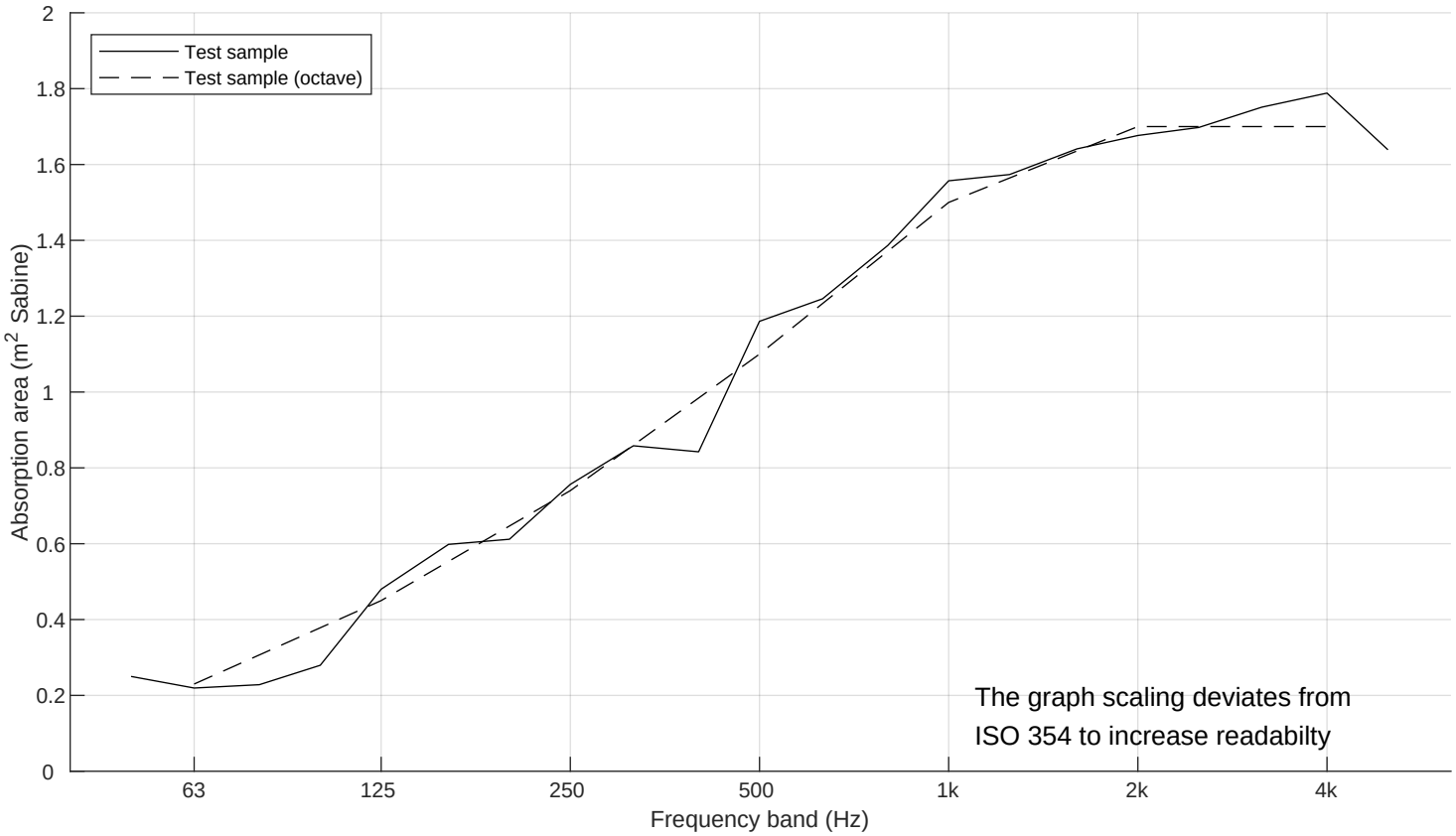
3333-M6.txt

and

3333-M7.txt

	Height	Width
Object 1 size	850	1200
Object 2 size	850	1800
Interpolated object size	600	1800

Area difference 6 %



AKUSTIKVERKSTAN

Absorba Table Screen 30, 850 x 1400

SOUND ABSORPTION AREA - CALCULATED FROM MEASUREMENTS

Calculated sound absorption area from ISO 354:2003 reverberation room measurements, evaluated according to ISO 20189:2018

Ackred. nr. 10445
Provning
ISO/IEC 17025

Report number:
3333-M13
Date
2024-01-24

Frequency f [Hz]	Sound absorption area per object [m² Sabine]	
50	0.29	
63	0.24	0.26
80	0.24	
100	0.30	
125	0.52	0.49
160	0.65	
200	0.67	
250	0.82	0.81
315	0.95	
400	0.92	
500	1.29	1.2
630	1.37	
800	1.56	
1000	1.72	1.7
1250	1.76	
1600	1.83	
2000	1.82	1.8
2500	1.84	
3150	1.86	
4000	1.91	1.9
5000	1.78	

N_{10} = 8.4

Client: Decibel By Johansson

Manufacturer: Decibel By Johansson

Product identification: Absorba Table Screen 30, 850 x 1400

Description of test specimen: Table screen made of a wooden frame with Ecophon filling covered with polyester wadding and fabric.
Nominal dimensions: 850 x 1400 x 30 mm.

Interpolation according to ISO 20189:2018 appendix E, based on measurements:

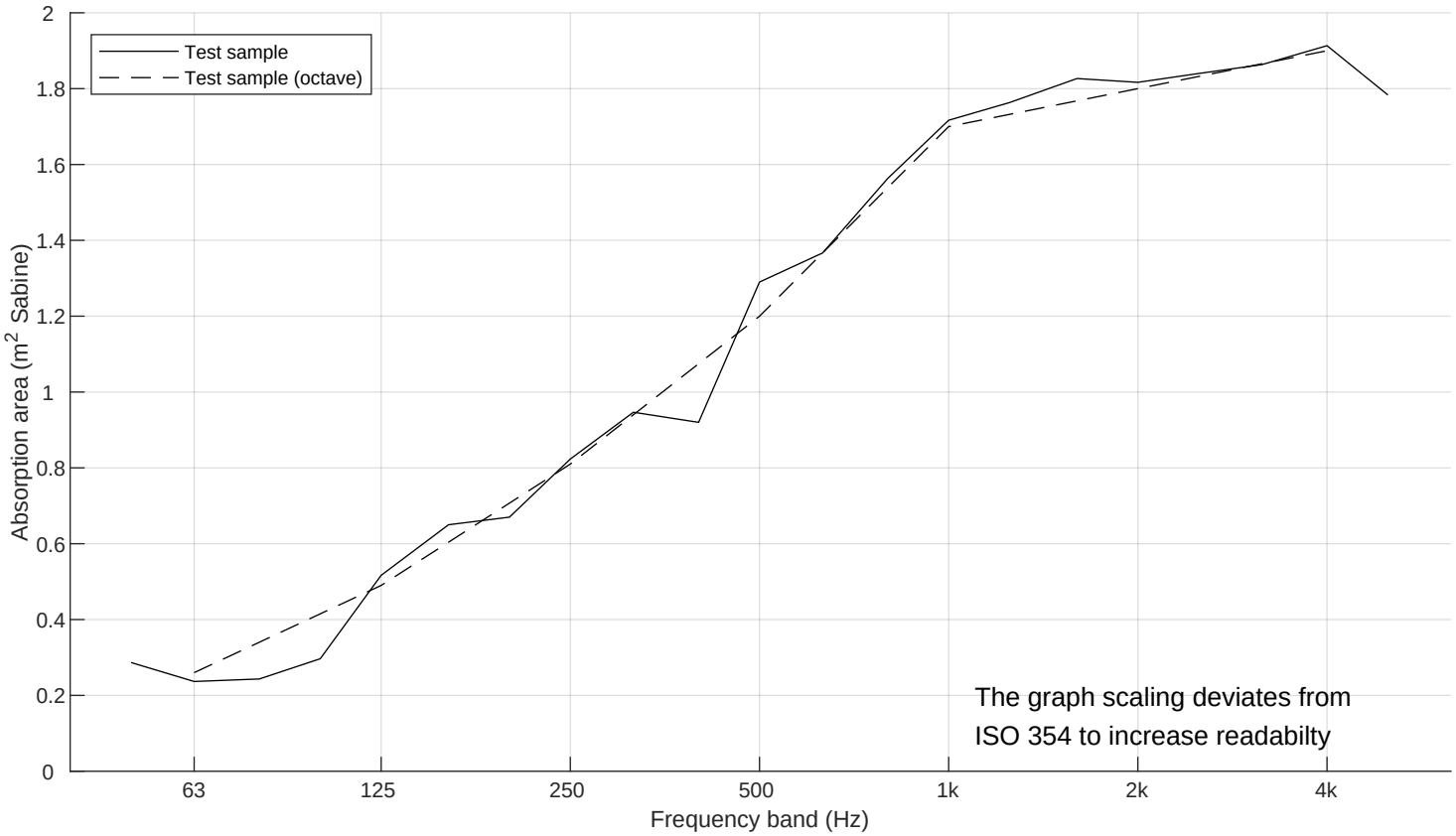
3333-M6.txt

and

3333-M7.txt

	Height	Width
Object 1 size	850	1200
Object 2 size	850	1800
Interpolated object size	850	1400

Area difference 14 %



AKUSTIKVERKSTAN

Absorba Table Screen 30, 850 x 1600

SOUND ABSORPTION AREA - CALCULATED FROM MEASUREMENTS

Calculated sound absorption area from ISO 354:2003 reverberation room measurements, evaluated according to ISO 20189:2018

Ackred. nr. 10445
Provning
ISO/IEC 17025

Report number:
3333-M14
Date
2024-01-24

Frequency f [Hz]	Sound absorption area per object [m² Sabine]	
50	0.34	
63	0.26	0.29
80	0.27	
100	0.32	
125	0.57	0.54
160	0.73	
200	0.76	
250	0.93	0.92
315	1.08	
400	1.04	
500	1.45	1.3
630	1.55	
800	1.84	
1000	1.96	2.0
1250	2.06	
1600	2.11	
2000	2.03	2.1
2500	2.06	
3150	2.04	
4000	2.11	2.1
5000	2.01	

N_{10} = 7.4

Client: Decibel By Johansson

Manufacturer: Decibel By Johansson

Product identification: Absorba Table Screen 30, 850 x 1600

Description of test specimen: Table screen made of a wooden frame with Ecophon filling covered with polyester wadding and fabric.
Nominal dimensions: 850 x 1600 x 30 mm.

Interpolation according to ISO 20189:2018 appendix E, based on measurements:

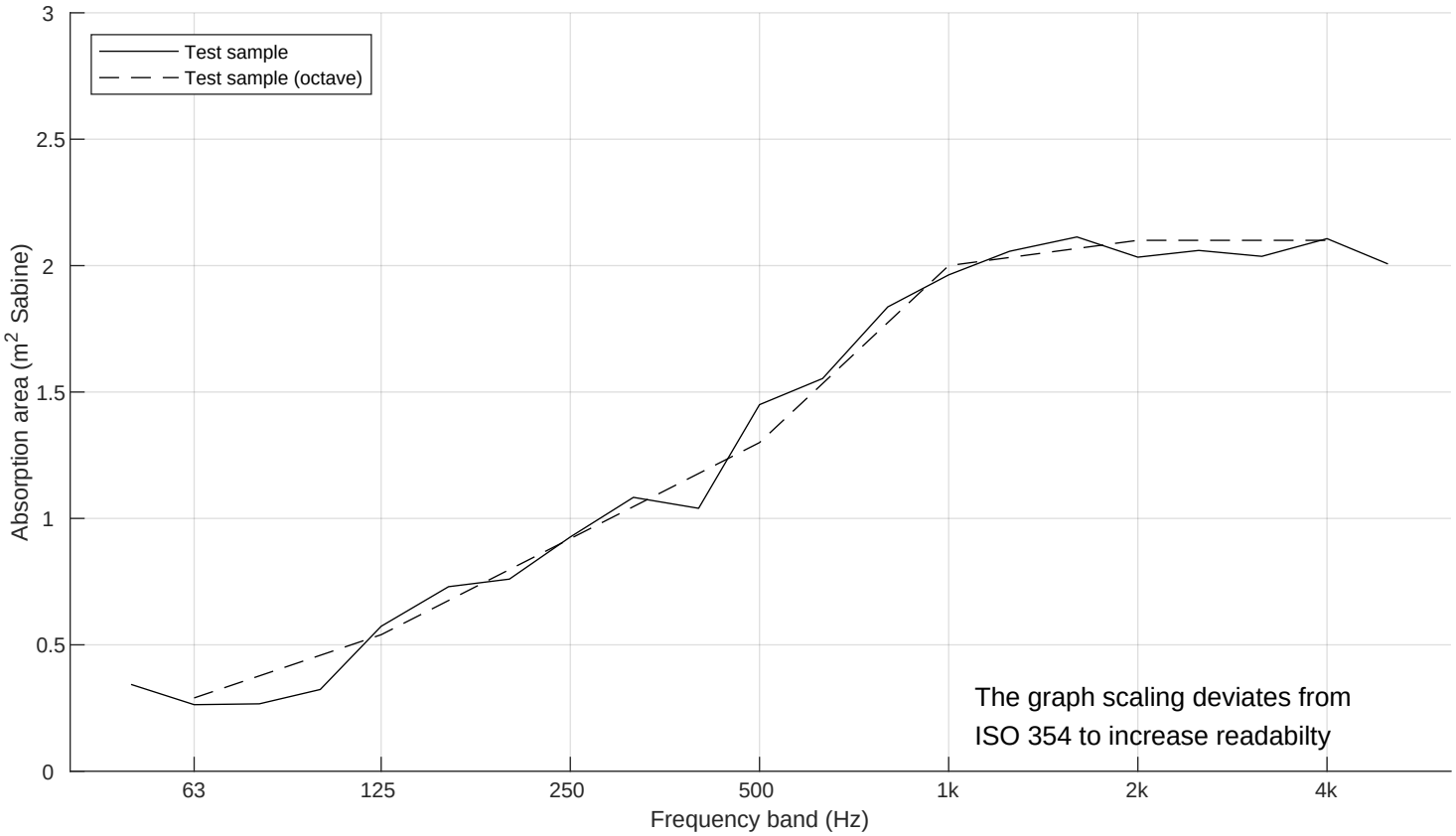
3333-M6.txt

and

3333-M7.txt

	Height	Width
Object 1 size	850	1200
Object 2 size	850	1800
Interpolated object size	850	1600

Area difference 11 %



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