Report 3832-R1
2024-10-09
3 pages, 5 appendices,
3 measurement protocols,
2 calculation protocols

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ABSORPTION MEASUREMENTS FOR SCREENIT LIGHT FROM GÖTESSONS

CONCLUSIONS

The sound absorption has been measured for ScreenIT Light desk screens from Götessons according to the reverberation room method SS-EN ISO 354:2003. The measurements have been evaluated according to ISO 20189:2018. The N_{10}-value, as used by the Swedish authority dealing with public purchasing, *Kammarkollegiet*, has been calculated.

In addition, sound absorption area has been calculated according to the methods described in ISO 20189:2018 for two other screen sizes.

A summary of the results is presented in table 1 and 2.

Measurement protocol	Test object	Sound absorption area in frequency band (Hz)						N_{10}
		125	250	500	1000	2000	4000	
M1	ScreenIT Light 800x600	0.11	0.19	0.19	0.24	0.35	0.63	53
M2	ScreenIT Light 1400x600	0.20	0.32	0.32	0.38	0.57	1.0	32
M3	ScreenIT Light 1800x600	0.35	0.42	0.42	0.50	0.74	1.2	24

Table 1: Summary of the measured results as practical absorption area as described in ISO 20189:2018 and as N_{10}-value as used by Kammarkollegiet.

Calculation protocol	Test object	Sound absorption area in frequency band (Hz)						N_{10}
		125	250	500	1000	2000	4000	
M4	ScreenIT Light 1200x600	0.17	0.27	0.27	0.33	0.50	0.87	37
M5	ScreenIT Light 1600x600	0.28	0.37	0.37	0.44	0.66	1.1	27

Table 2: Summary of the calculated results as practical absorption area as described in ISO 20189:2018 and as N_{10}-value as used by Kammarkollegiet.

Detailed results for all desk screens are available in the measurement and calculation protocols according to table 1 and 2, attached as appendices to this report.

1. CLIENT

Götessons Industri AB, Rönnåsgatan 5B, 523 38 Ulricehamn
Contact: Emilia Anderö, emilia.andero@gotessons.se, +46 (0)321-68 77 36

2. ASSIGNMENT

To measure the sound absorption area for three desk screens in the ScreenIT Light series from Götessons according to SS-EN ISO 354:2003. The measurements shall be evaluated according to ISO 20189:2018.

To interpolate results for two more screens according to ISO 20189:2018.
Akustikverkstan is accredited for these standards.

3. TEST OBJECTS

ScreenIT Light is a series of desk screens consisting of a core of rigid foam, covered with a laminated textile (Gabriel Event Screen). The thickness of the screens is measured to 40 mm. Other measured dimensions of the objects are given in table 3.

Test object name from client	Width (mm)	Height (mm)	Weight (g)	Measurement protocol
ScreenIT Light 800x600	810	610	990	M1
ScreenIT Light 1400x600	1410	610	1630	M2
ScreenIT Light 1800x600	1810	610	2270	M3

Table 3: Tested objects with measured dimensions and weight.

All measured screens were tested standing upright on the floor. When testing screens for desks, one single screen foot was used.

Photos of the test setups are available in Appendix 5.

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 2024-10-01 in Akustikverkstan's reverberation room in Skultorp, Skövde, Sweden. More information on the test facilities can be found in Appendix 2.

5. CALCULATIONS

Based on the measurements in this report, calculations have been made for two more screens in the same series. The calculation is done as a linear interpolation based on the area of the objects, in accordance with appendix E of ISO 20189:2018

6. RESULTS

Result as N_{10}-values are given in table 1 and 2 on the first page.

Detailed results for all desk screens are available in the measurement and calculation protocols according to table 1 and 2, attached as appendices to this report.

The results are only valid for the tested sample.

7. COMMENTS AND INTERPRETATIONS

7.1 N10-value

The N_{10} value is a comparative value that applies to acoustic products with sound absorbing properties. *Kammarkollegiet*, the Swedish authority dealing with public purchasing, uses the value in their advice regarding purchasing of sound absorbers. The N_{10} value is calculated with the formula:

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

A_{dim} is the average sound absorption area of the three 1/3 octave bands in the 500 Hz octave band. 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 STANDARDS

ISO 20189:2018 requires that the sound absorption in each frequency band is above 1 m^2. This is not the case for the lower frequencies.

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

Joachim Schubert

Reviewed by Johan Jernstedt, 2024-10-09

APPENDIX 1: MEASURED REVERBERATION TIMES

f(Hz)	Empty room	ScreenIT Light 800x600	ScreenIT Light 1400x600	ScreenIT Light 1800x600
50	7.86	7.62	7.17	7.38
63	8.45	8.23	7.69	8.08
80	8.47	7.85	7.18	7.55
100	7.88	7.49	6.86	7.50
125	7.03	6.00	5.72	5.52
160	5.56	5.00	4.90	5.05
200	5.51	4.65	4.39	4.80
250	5.52	4.73	4.52	4.79
315	5.39	4.72	4.61	4.80
400	5.19	4.63	4.38	4.62
500	4.76	4.15	3.99	4.31
630	4.25	3.73	3.64	3.78
800	4.65	3.95	3.84	4.16
1000	4.59	3.94	3.81	3.99
1250	4.02	3.50	3.38	3.58
1600	3.69	3.18	3.06	3.21
2000	3.32	2.81	2.70	2.90
2500	3.02	2.51	2.38	2.59
3150	2.55	2.10	2.01	2.18
4000	2.13	1.76	1.66	1.82
5000	1.71	1.41	1.35	1.46

Number of test objects / test area	0	5	4	2
Temp (°C)	23.0	22.5	22.0	21.8
RH (%)	40	40	40	40

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.

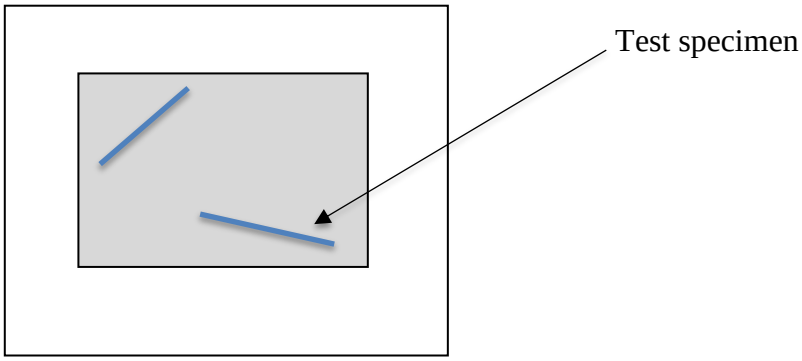


Figure A2.1: Plane drawing of the reverberation room with the test specimen put on the mounting area.

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. 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 A4.1: Measurement uncertainty for each third octave.

APPENDIX 5: PHOTOS OF THE TEST SET UP

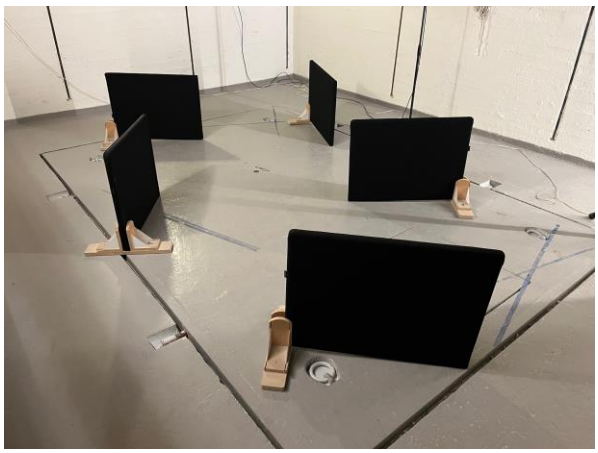


Figure A5:1 ScreenIT Light 800x600

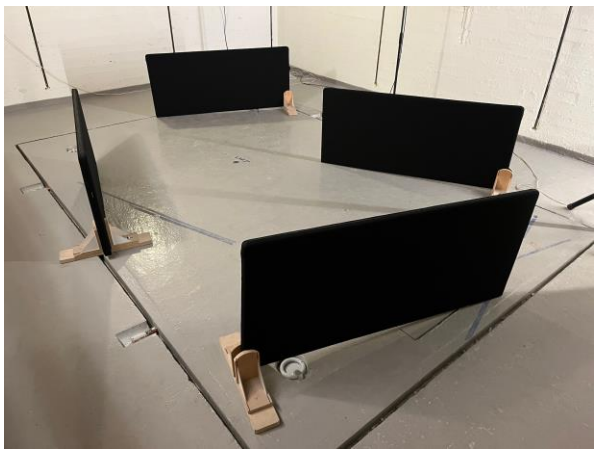


Figure A5:2: ScreenIT Light 1400x600

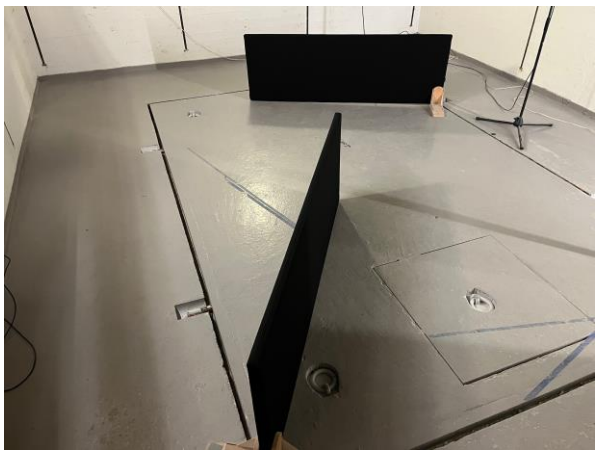


Figure A5:3: ScreenIT Light 1800x600

ScreenIT Light 800x600

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:
3832-M1
Date
2024-10-08

Frequency f [Hz]	Sound absorption area per object [m² Sabine]	
50	0.03	
63	0.02	0.04
80	0.06	
100	0.04	
125	0.16	0.11
160	0.13	
200	0.22	
250	0.19	0.19
315	0.17	
400	0.15	
500	0.20	0.19
630	0.22	
800	0.25	
1000	0.23	0.24
1250	0.24	
1600	0.28	
2000	0.35	0.35
2500	0.43	
3150	0.52	
4000	0.62	0.63
5000	0.75	

N_{10} = 53

Client: Götessons

Manufacturer: Götessons

Product identification: ScreenIT Light 800x600

Description of test specimen: Desk screen made of rigid foam covered with laminated textile. Thickness: 40 mm. Tested standing on the floor.

Reverberation room volume: 200 m³

Temperature: 22.5 °C (empty: 23.0 °C)

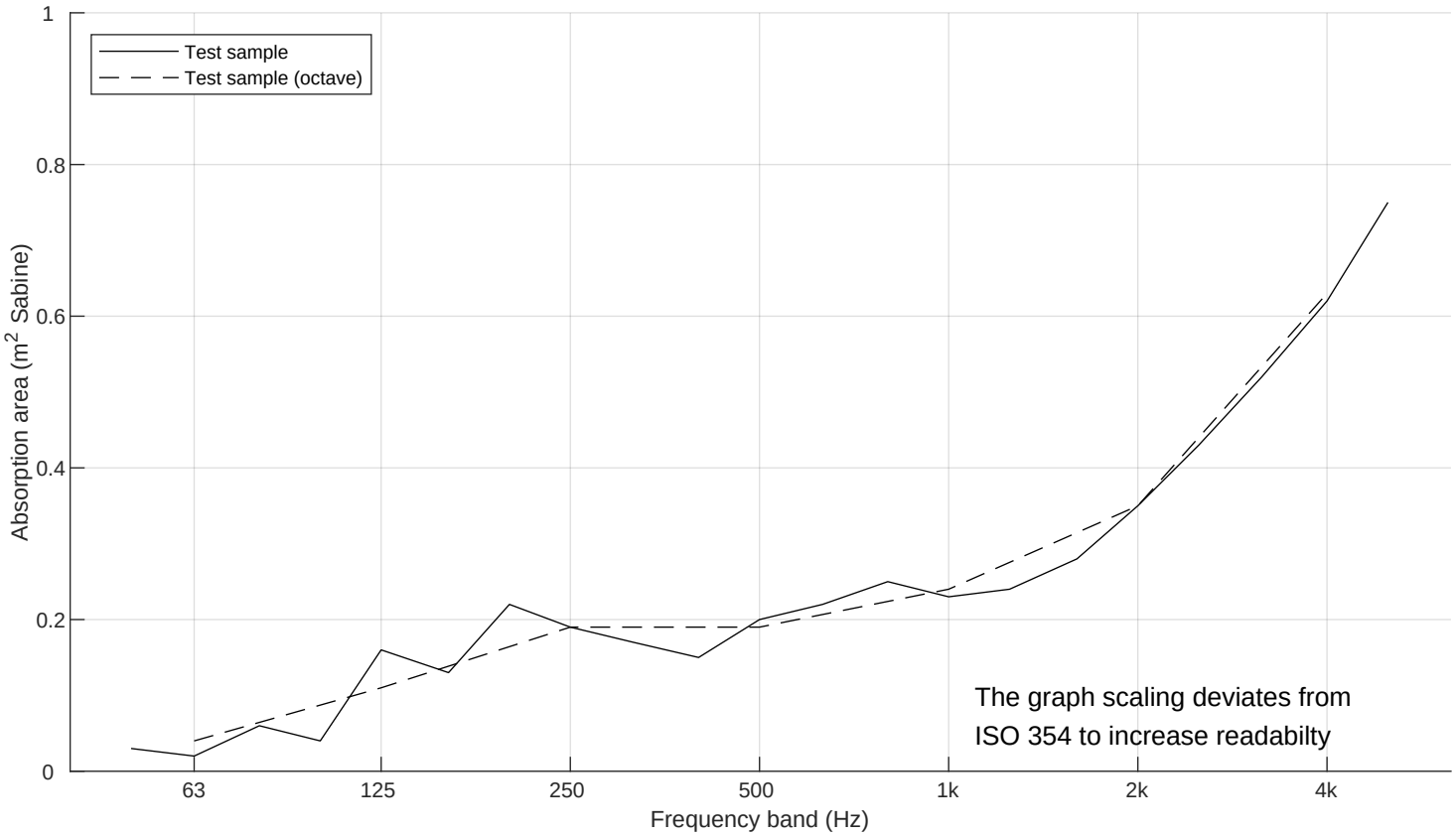
Air humidity: 40 % (empty: 40 %)

Air pressure: 100.0 kPa (empty:100.0 kPa)

Number of objects: 5

Measurement date: 2024-10-01

Measured by: Joachim Schubert



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RT20241001_1422_tom_lunch.mat
RT20241001_1510_ScreenIT_light_1800x600x40_2st.mat

ScreenIT Light 1400x600

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

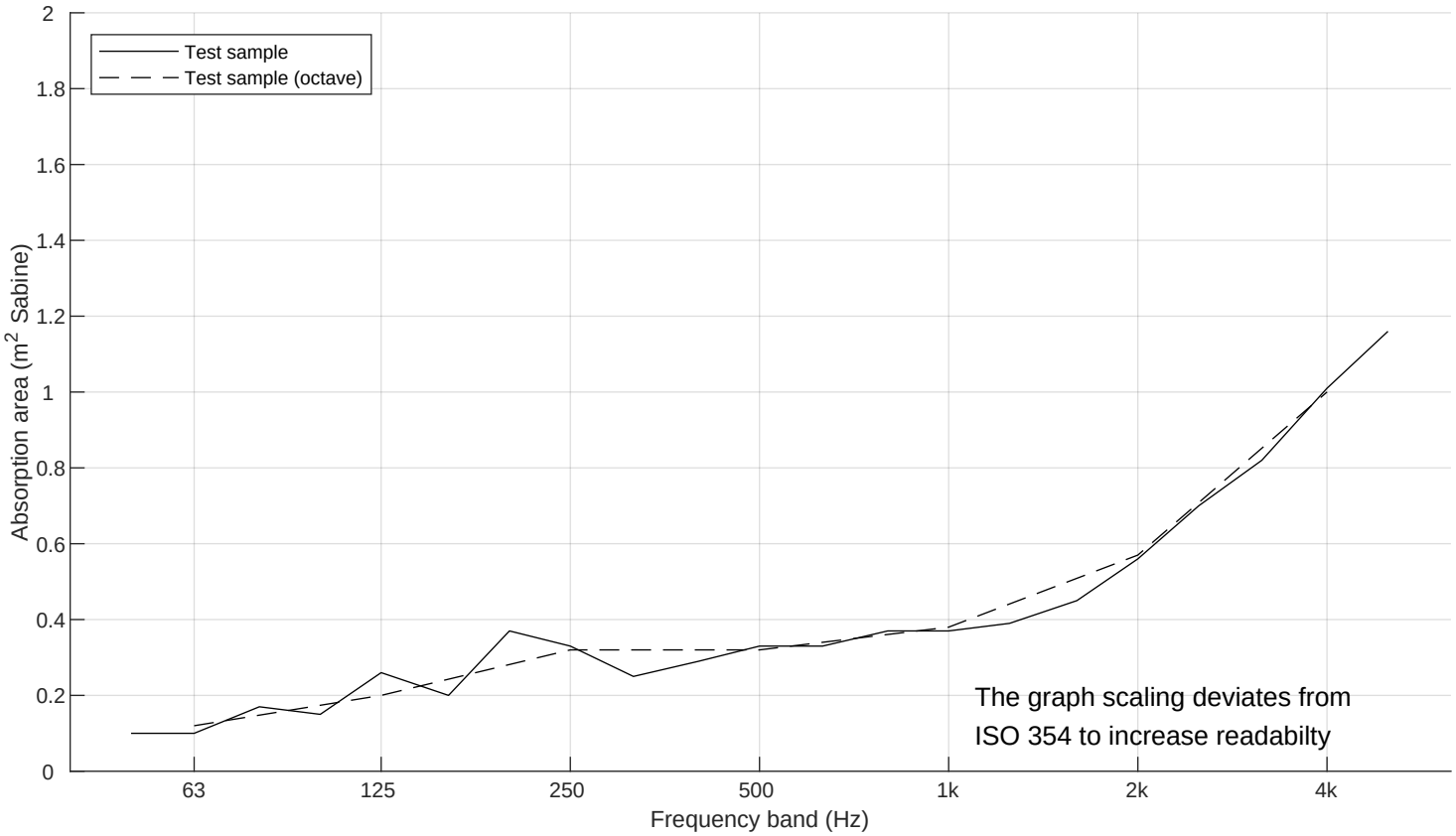
Report number:
3832-M2
Date
2024-10-08

Frequency f [Hz]	Sound absorption area per object [m^2 Sabine]	
50	0.10	
63	0.10	0.12
80	0.17	
100	0.15	
125	0.26	0.20
160	0.20	
200	0.37	
250	0.33	0.32
315	0.25	
400	0.29	
500	0.33	0.32
630	0.33	
800	0.37	
1000	0.37	0.38
1250	0.39	
1600	0.45	
2000	0.56	0.57
2500	0.70	
3150	0.82	
4000	1.01	1.0
5000	1.16	

N_{10} = 32

Client:	Götessons
Manufacturer:	Götessons
Product identification:	ScreenIT Light 1400x600
Description of test specimen:	Desk screen made of rigid foam covered with laminated textile. Thickness: 40 mm. Tested standing on the floor.

Reverberation room volume:	200 m^3	
Temperature:	22.0 °C	(empty: 23.0 °C)
Air humidity:	40 %	(empty: 40 %)
Air pressure:	100.0 kPa	(empty:100.0 kPa)
Number of objects:	4	
Measurement date:	2024-10-01	
Measured by:	Joachim Schubert	



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RT20241001_1422_tom_lunch.mat
RT20241001_1458_ScreenIT_light_1400x600x40_4st.mat

ScreenIT Light 1800x600

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:
3832-M3
Date
2024-10-08

Frequency f [Hz]	Sound absorption area per object [m² Sabine]	
50	0.14	
63	0.09	0.16
80	0.24	
100	0.11	
125	0.63	0.35
160	0.30	
200	0.44	
250	0.45	0.42
315	0.38	
400	0.40	
500	0.37	0.42
630	0.50	
800	0.43	
1000	0.55	0.50
1250	0.52	
1600	0.67	
2000	0.69	0.74
2500	0.86	
3150	1.01	
4000	1.16	1.2
5000	1.40	

N_{10} = 24

Client: Götessons

Manufacturer: Götessons

Product identification: ScreenIT Light 1800x600

Description of test specimen: Desk screen made of rigid foam covered with laminated textile. Thickness: 40 mm. Tested standing on the floor.

Reverberation room volume: 200 m³

Temperature: 21.8 °C (empty: 23.0 °C)

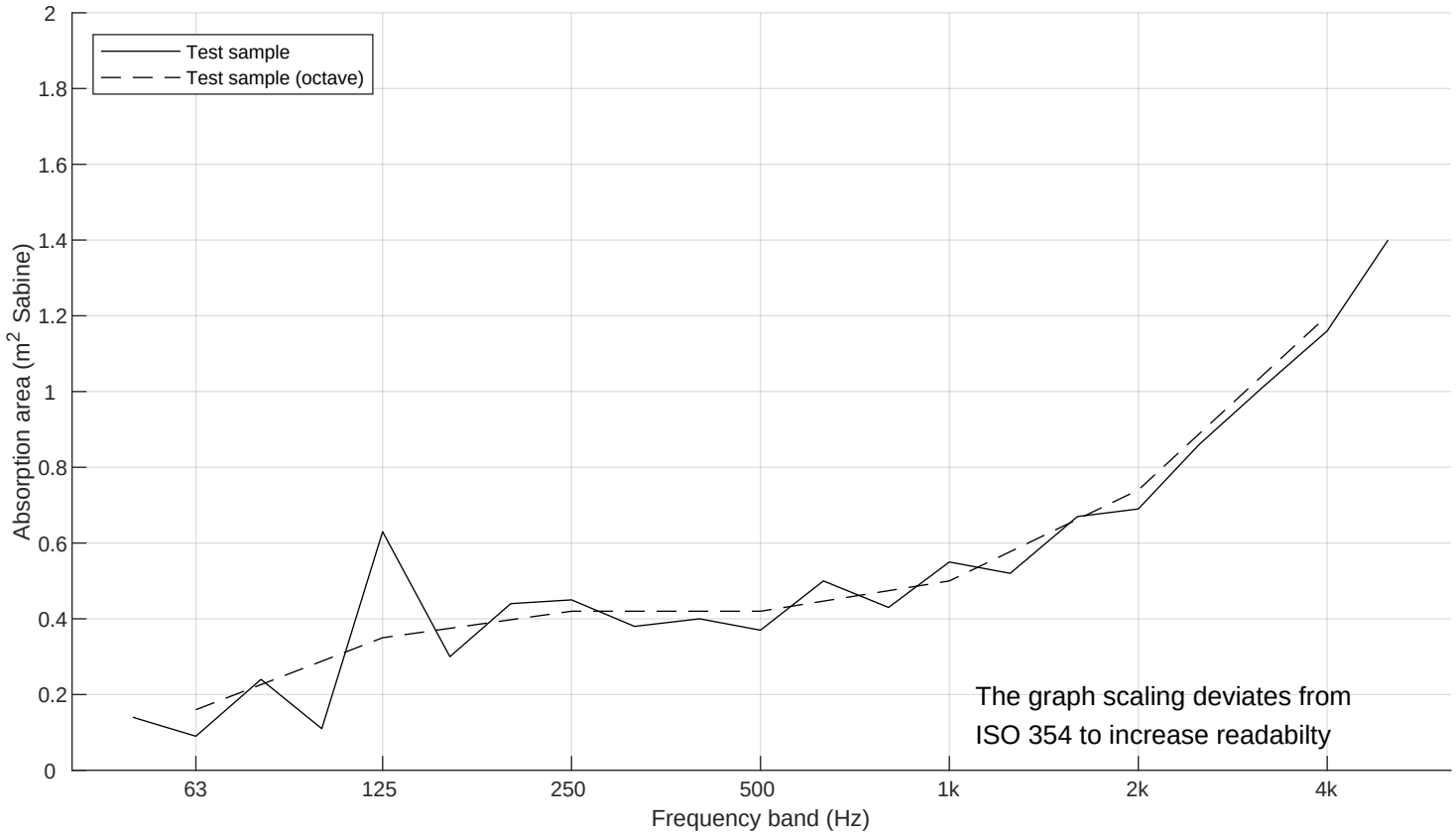
Air humidity: 40 % (empty: 40 %)

Air pressure: 100.0 kPa (empty:100.0 kPa)

Number of objects: 2

Measurement date: 2024-10-01

Measured by: Joachim Schubert



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RT20241001_1422_tom_lunch.mat
RT20241001_1510_ScreenIT_light_1800x600x40_2st.mat

ScreenIT Light 1200x600

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:
3832-M4
Date
2024-10-09

Frequency f [Hz]	Sound absorption area per object [m² Sabine]	
50	0.08	
63	0.07	0.09
80	0.13	
100	0.11	
125	0.23	0.17
160	0.18	
200	0.32	
250	0.28	0.27
315	0.22	
400	0.24	
500	0.29	0.27
630	0.29	
800	0.33	
1000	0.32	0.33
1250	0.34	
1600	0.39	
2000	0.49	0.50
2500	0.61	
3150	0.72	
4000	0.88	0.87
5000	1.02	

N_{10} = 37

Client: Götessons

Manufacturer: Götessons

Product identification: ScreenIT Light 1200x600

Description of test specimen: Desk screen made of rigid foam covered with laminated textile.
Thickness: 40mm

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

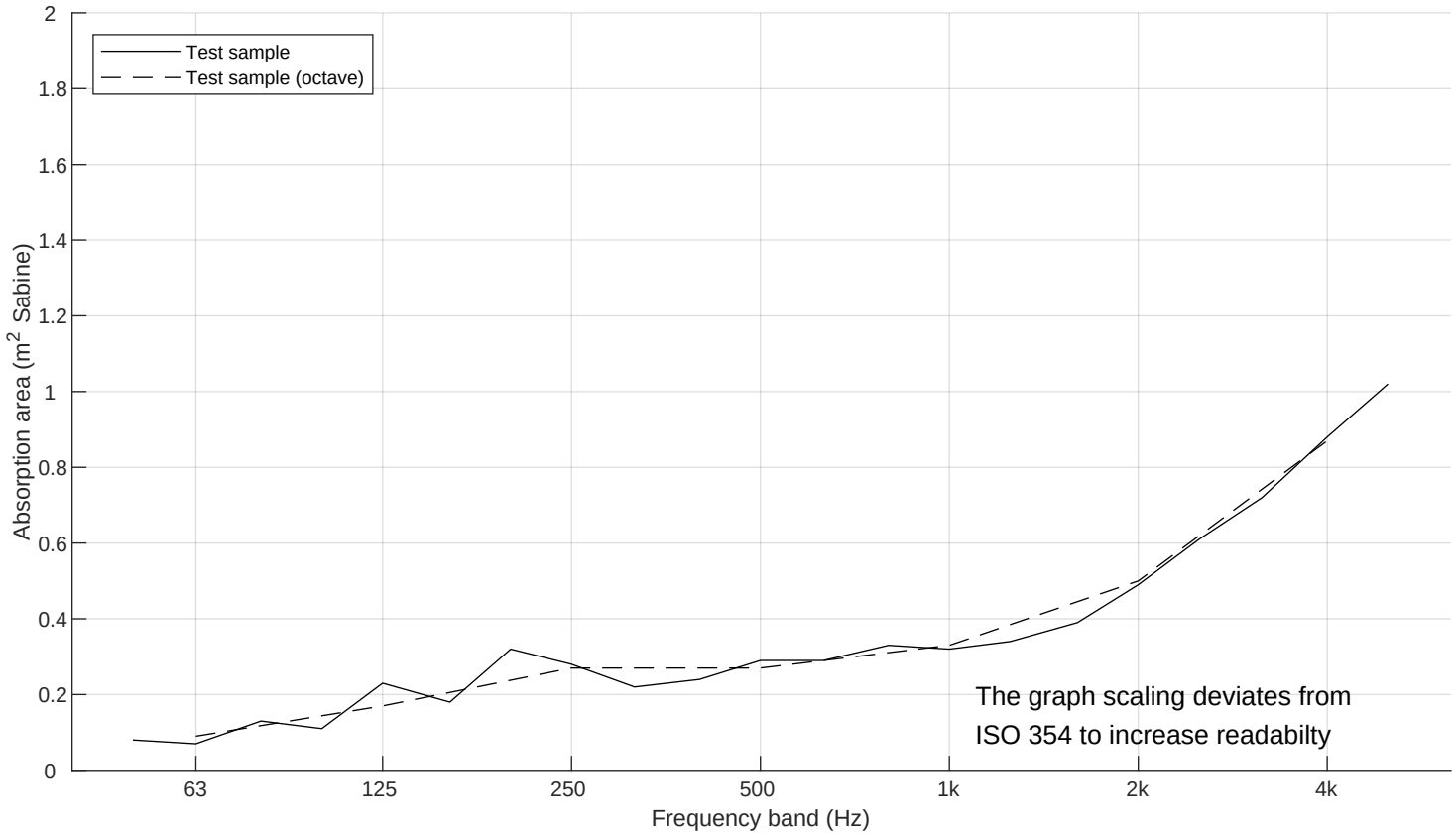
3832-M1 ScreenIt Light 800x600x40.txt

and

3832-M2 ScreenIt Light 1400x600x40.txt

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

Area difference 14 %



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ScreenIT Light 1600x600

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:
3832-M5
Date
2024-10-09

Frequency f [Hz]	Sound absorption area per object [m² Sabine]	
50	0.12	
63	0.10	0.14
80	0.21	
100	0.13	
125	0.45	0.28
160	0.25	
200	0.41	
250	0.39	0.37
315	0.32	
400	0.34	
500	0.35	0.37
630	0.42	
800	0.40	
1000	0.46	0.44
1250	0.46	
1600	0.56	
2000	0.62	0.66
2500	0.78	
3150	0.92	
4000	1.08	1.1
5000	1.28	

N_{10} = 27

Client: Götessons

Manufacturer: Götessons

Product identification: ScreenIT Light 1600x600

Description of test specimen: Desk screen made of rigid foam covered with laminated textile.
Thickness: 40mm

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

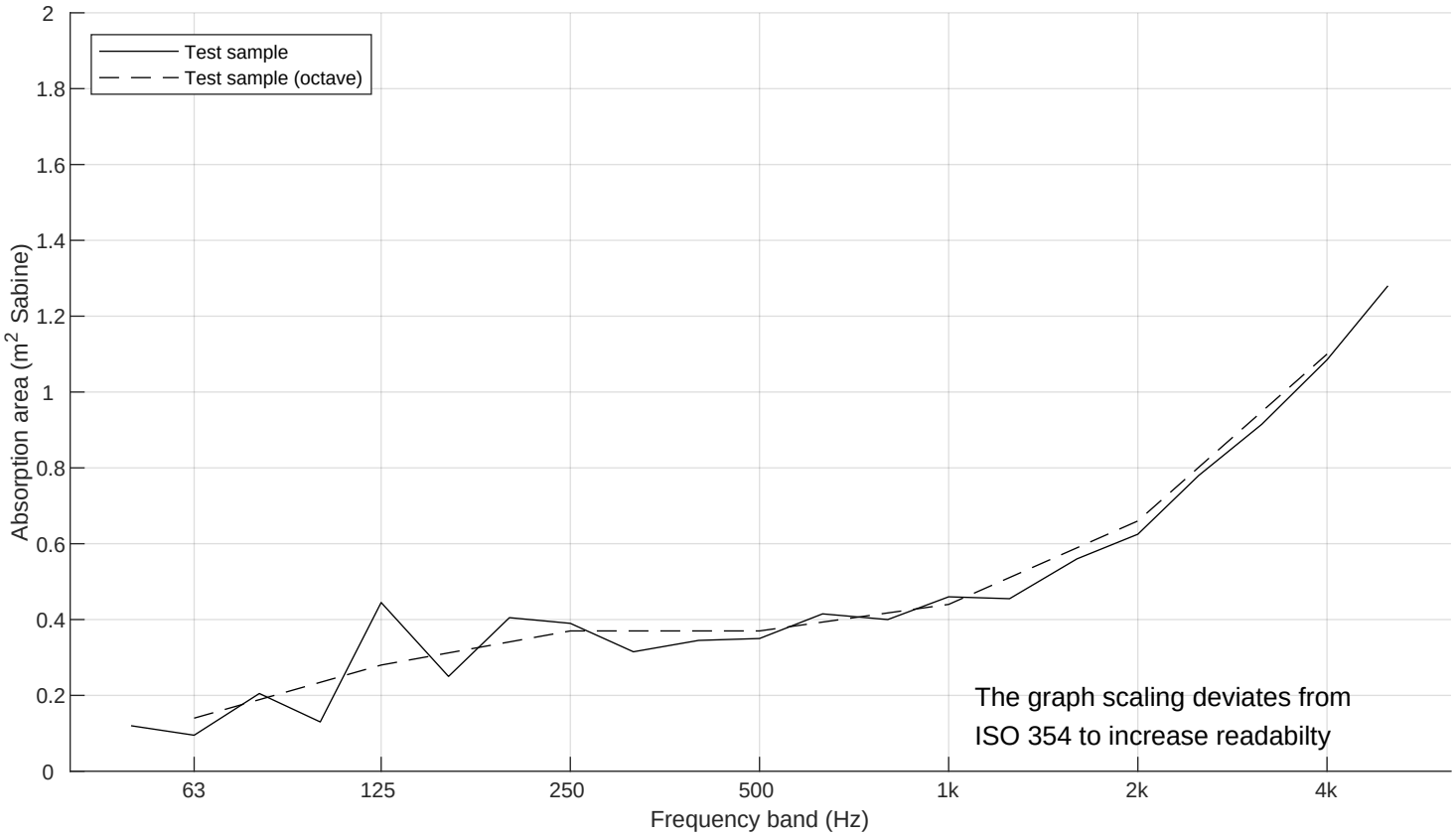
3832-M2 ScreenIt Light 1400x600x40.txt

and

3832-M3 ScreenIt Light 1800x600x40.txt

	Height	Width
Object 1 size	600	1400
Object 2 size	600	1800
Interpolated object size	600	1600

Area difference 11 %



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