

SOUND ABSORPTION MEASUREMENTS FOR SCREENIT SILENT DESK SCREENS FROM GÖTESSONS

CONCLUSIONS

The sound absorption area for four sizes of ScreenIT Silent, desk screens, from Götessons, has been measured according to the reverberation room method SS-EN ISO 354:2003. The measurements have been evaluated according to SS 25269:2013. Interpolated results according to ISO 20189:2018 have been calculated for four sizes that were not measured.

The results as N_{10} -value as defined by *Kammarkollegiet* for the measured products are presented in the table below.

Test object	N_{10}
ScreenIT Silent 800 x 650	24
ScreenIT Silent 1400 x 650	14
ScreenIT Silent 1800 x 650	11
ScreenIT Silent 1800 x 800	8.3

1. CLIENT

Götessons Industri AB, Rönnåsgatan 5B, 523 38 Ulricehamn
Contact: Stellan Bygård, tel 0321-687761, stellan.b@gotessons.se

2. ASSIGNMENT

To measure the sound absorption area for four sizes of ScreenIT Silent, desk screens, from Götessons according to SS-EN ISO 354:2003 and evaluate according to SS 25269:2013. Akustikverkstan is accredited for both these standards. The sound absorption for four additional sizes should be interpolated according to ISO 20189:2018.

3. TEST OBJECTS

The ScreenIT Silent desk screen is based on a wooden frame with a 30 mm sound absorber, covered with fabric which gives a total thickness of 32 mm. The tested screen sizes are presented in table 1. Photos of all measurement setups are shown in *Appendix 3: Photos*.

Test object	Size L x W x D (mm)	Measurement protocol
ScreenIT Silent	800 x 650 x 32	20-738-M1
ScreenIT Silent	1400 x 650 x 32	20-738-M2
ScreenIT Silent	1800 x 650 x 32	20-738-M3
ScreenIT Silent	1800 x 800 x 32	20-738-M4

Table 1: Measured test objects

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 SS 25269:2013

The measurements were performed by Carl Nyqvist 2020-10-14 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 are available in measurement protocols 20-738-M1 to M4 belonging to this report. The results are only valid for the tested samples.

7. COMMENTS AND INTERPRETATIONS

7.1 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 sound absorption area at 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 m² 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.

The N_{10} value for the tested objects can be seen in table 3.

Measurement protocol	Test object	N_{10}
M1	ScreenIT Silent 800 x 650	24
M2	ScreenIT Silent 1400 x 650	14
M3	ScreenIT Silent 1800 x 650	11
M4	ScreenIT Silent 1800 x 800	8.3

Table 3: N_{10} -value for the tested objects.

7.2 Calculated sound absorption area according to ISO 20189:2018

ISO 20189:2018 contains a method to calculate the sound absorption for products in the same product line in different sizes. For desk screens, the object area is not allowed to differ more than 25 % from the measured. The calculation is made as a linear interpolation based on the object area.

The calculated sound absorption area is presented in protocols 20-738-M5 to M8.

The N_{10} -value for the products is presented in table 4 below.

Measurement protocol	Test object	N_{10}
M5	ScreenIT Silent 800 x 800	20
M6	ScreenIT Silent 1600 x 650	12
M7	ScreenIT Silent 1400 x 800	11
M8	ScreenIT Silent 1600 x 800	10

Table 4: N_{10} -values based on calculated sound absorption area for the products.

8. MEASUREMENT UNCERTAINTY

The uncertainties in the measured sound absorption coefficients have been estimated to the values in table 5. 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 5: 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.

Carl Nyqvist

Reviewed by Johan Jernstedt, 2020-10-27

APPENDIX 1: MEASURED REVERBERATION TIMES

Frequency (Hz)	Empty room	ScreenIT Silent 800 x 650	ScreenIT Silent 1400 x 650	ScreenIT Silent 1800 x 650	ScreenIT Silent 1800 x 800
50	8.19	7.23	6.77	6.61	6.29
63	8.43	7.18	6.80	6.57	6.26
80	7.65	6.67	6.53	6.29	6.10
100	7.91	7.16	6.89	6.63	6.40
125	6.97	5.44	5.41	5.11	4.87
160	5.69	4.64	4.56	4.35	4.36
200	5.48	4.50	4.24	4.08	3.95
250	5.38	4.42	4.20	3.96	3.84
315	5.36	4.50	4.28	4.05	3.86
400	5.32	4.19	3.99	3.75	3.48
500	4.80	3.85	3.69	3.42	3.14
630	4.28	3.49	3.26	3.05	2.79
800	4.64	3.60	3.38	3.15	2.82
1000	4.56	3.53	3.35	3.15	2.75
1250	3.95	3.15	2.97	2.79	2.53
1600	3.61	2.90	2.77	2.59	2.31
2000	3.26	2.64	2.48	2.36	2.12
2500	2.94	2.40	2.26	2.16	1.94
3150	2.47	2.05	1.96	1.86	1.73
4000	2.07	1.77	1.68	1.61	1.49
5000	1.70	1.48	1.42	1.38	1.29

Number of test objects	0	4	3	3	3
Temperature (°C)	20.5	20.0	19.8	19.6	19.3
RH (%)	44	45	45	45	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 m³ and the total area of the walls, ceiling and floor is 209 m². 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 m², 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.

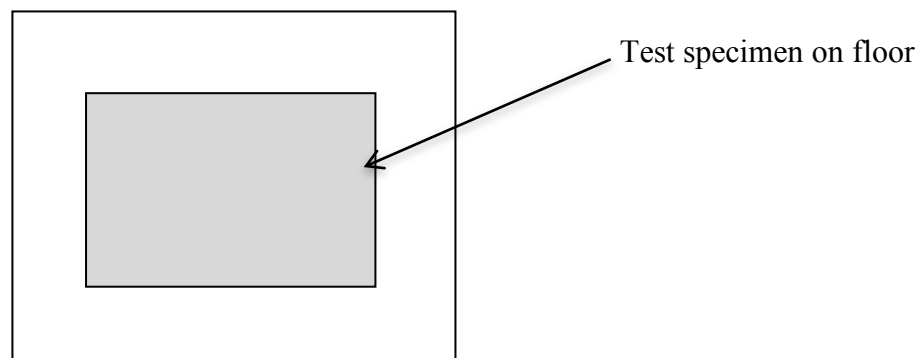


Figure A2.1: Plane drawing of the reverberation room with the positions of the test specimens.

APPENDIX 3: PHOTOS



Figure A3.1: Measurement setup
ScreenIT Silent 800 x 650



Figure A3.2: Measurement setup
ScreenIT Silent 1400 x 650



Figure A3.3: Measurement setup
ScreenIT Silent 1800 x 650



Figure A3.4: Measurement setup
ScreenIT Silent 1800 x 800

ScreenIT Silent 800 x 650

SOUND ABSORPTION AREA ACCORDING TO SS-EN ISO 354:2003, SS 25269:2013 and ISO 20189:2018

Measurement of sound absorption area in a reverberation room



Report number:
20-738-M1
Date
2020-10-23

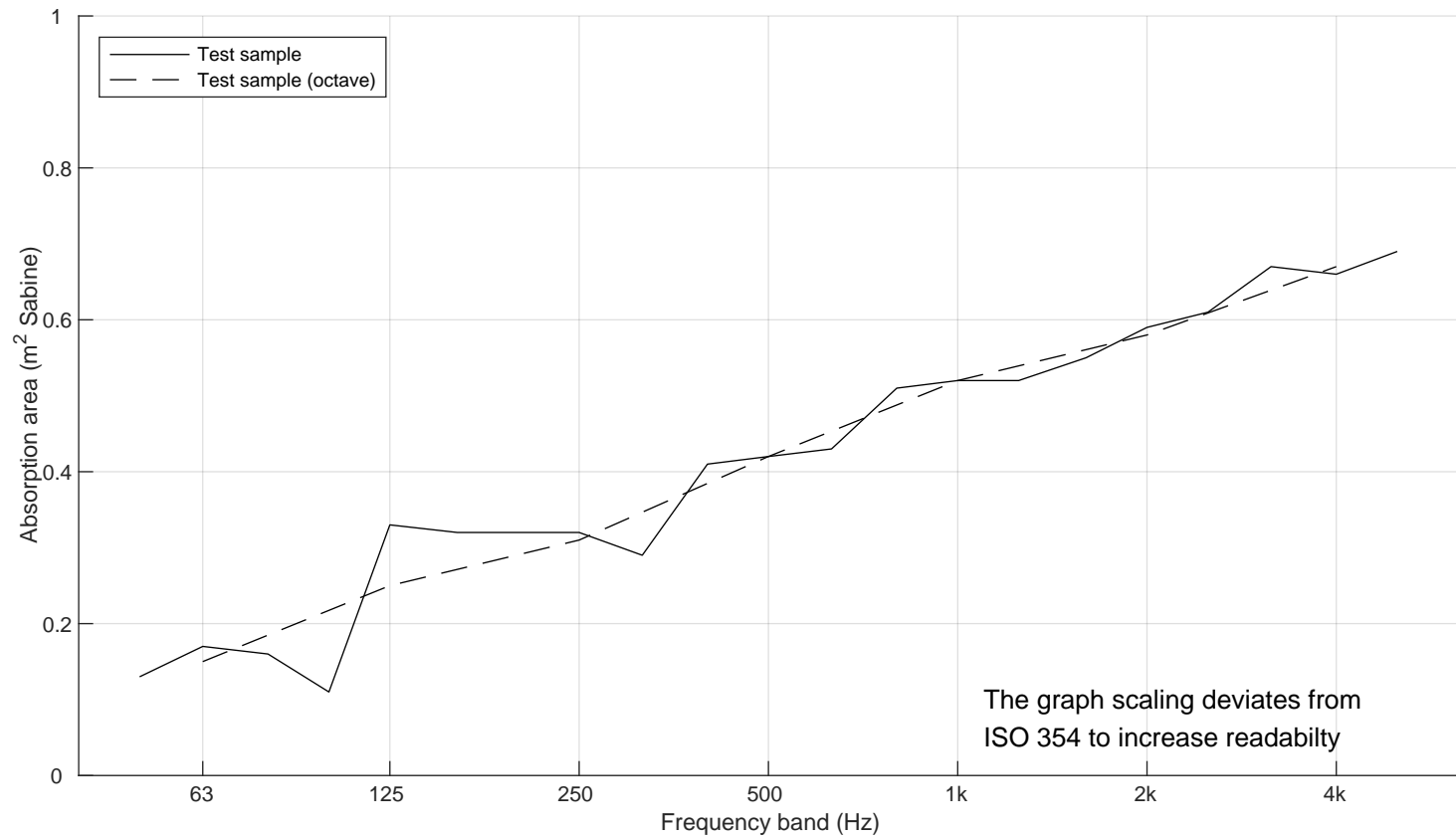
Frequency f [Hz]	Sound absorption area [m ² Sabine]	
50	0.13	
63	0.17	0.15
80	0.16	
100	0.11	
125	0.33	0.25
160	0.32	
200	0.32	
250	0.32	0.31
315	0.29	
400	0.41	
500	0.42	0.42
630	0.43	
800	0.51	
1000	0.52	0.52
1250	0.52	
1600	0.55	
2000	0.59	0.58
2500	0.61	
3150	0.67	
4000	0.66	0.67
5000	0.69	

Client: Götessons industri AB
 Manufacturer: Götessons industri AB
 Product identification: ScreenIT Silent 800 x 650

Description of test specimen: Desk Screen 800 x 650 x 32 mm.
 Mounted standing on floor.

Reverberation room volume: 200 m³
 Temperature: 20.0 °C (empty: 20.5 °C)
 Air humidity: 45 % (empty: 44 %)
 Air pressure: 100.2 kPa (empty: 100.2 kPa)
 Number of specimens: 4

Measurement date: 2020-10-14
 Measured by: Carl Nyqvist



$N_{10} = 24$

ScreenIT Silent 1400 x 650

SOUND ABSORPTION AREA ACCORDING TO SS-EN ISO 354:2003, SS 25269:2013 and ISO 20189:2018

Measurement of sound absorption area in a reverberation room



Report number:
20-738-M2
Date
2020-10-23

Frequency f [Hz]	Sound absorption area [m ² Sabine]	
50	0.28	
63	0.31	0.28
80	0.24	
100	0.20	
125	0.45	0.37
160	0.47	
200	0.58	
250	0.57	0.55
315	0.51	
400	0.68	
500	0.68	0.72
630	0.80	
800	0.87	
1000	0.86	0.88
1250	0.91	
1600	0.91	
2000	1.05	1.0
2500	1.10	
3150	1.14	
4000	1.19	1.2
5000	1.23	

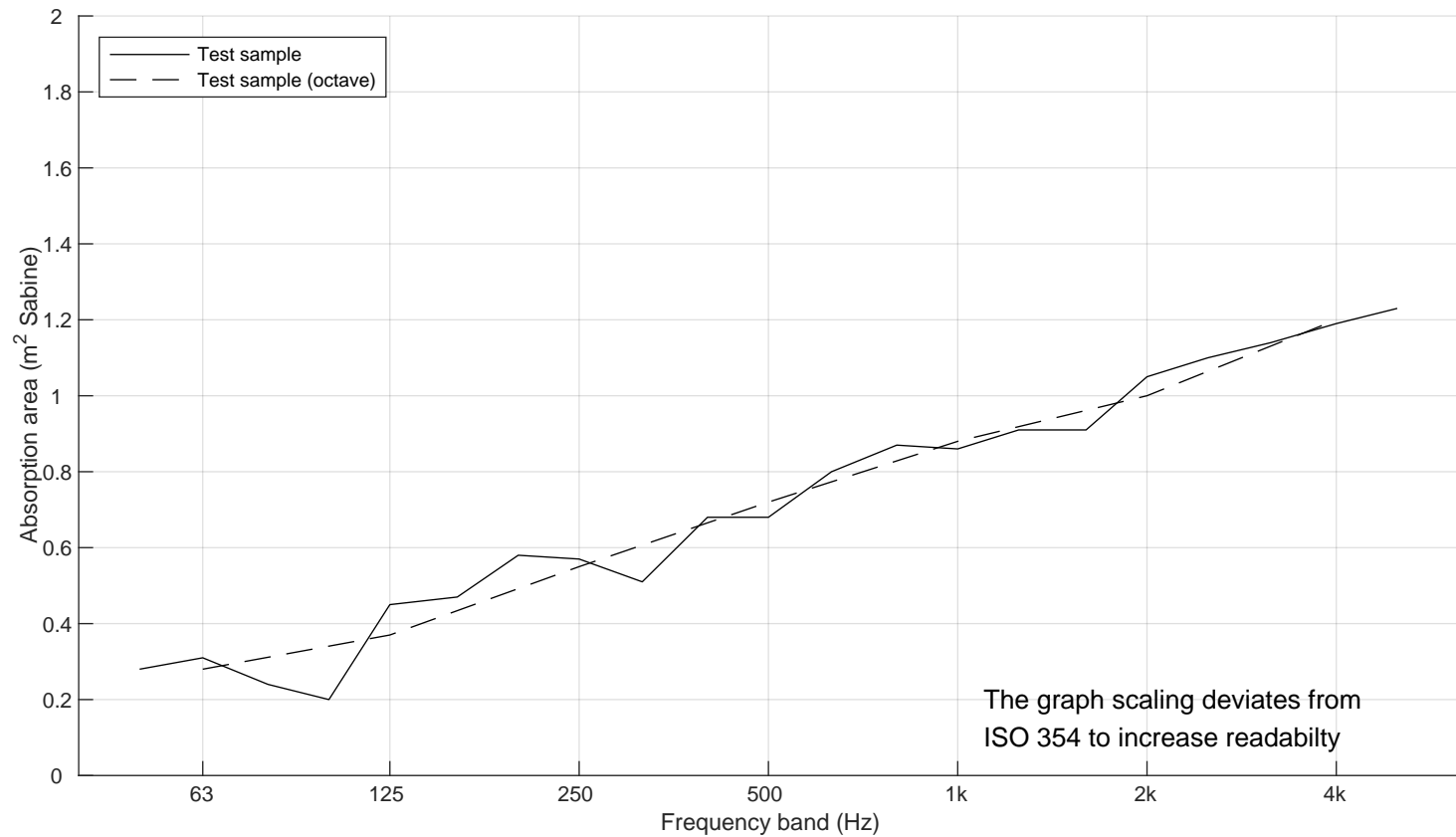
Client: Götessons industri AB
 Manufacturer: Götessons industri AB
 Product identification: ScreenIT Silent 1400 x 650

Description of test specimen: Desk Screen 1400 x 650 x 32 mm.
 Mounted standing on floor.

Reverberation room volume: 200 m³
 Temperature: 19.8 °C (empty: 20.5 °C)
 Air humidity: 45 % (empty: 44 %)
 Air pressure: 100.2 kPa (empty: 100.2 kPa)
 Number of specimens: 3

Measurement date: 2020-10-14
 Measured by: Carl Nyqvist

$N_{10} = 14$



ScreenIT Silent 1800 x 650

SOUND ABSORPTION AREA ACCORDING TO SS-EN ISO 354:2003, SS 25269:2013 and ISO 20189:2018

Measurement of sound absorption area in a reverberation room



Report number:
20-738-M3
Date
2020-10-23

Frequency f [Hz]	Sound absorption area [m ² Sabine]	
50	0.32	
63	0.36	0.33
80	0.31	
100	0.27	
125	0.57	0.47
160	0.58	
200	0.68	
250	0.72	0.69
315	0.66	
400	0.85	
500	0.91	0.93
630	1.02	
800	1.11	
1000	1.06	1.1
1250	1.14	
1600	1.18	
2000	1.27	1.3
2500	1.32	
3150	1.43	
4000	1.44	1.4
5000	1.41	

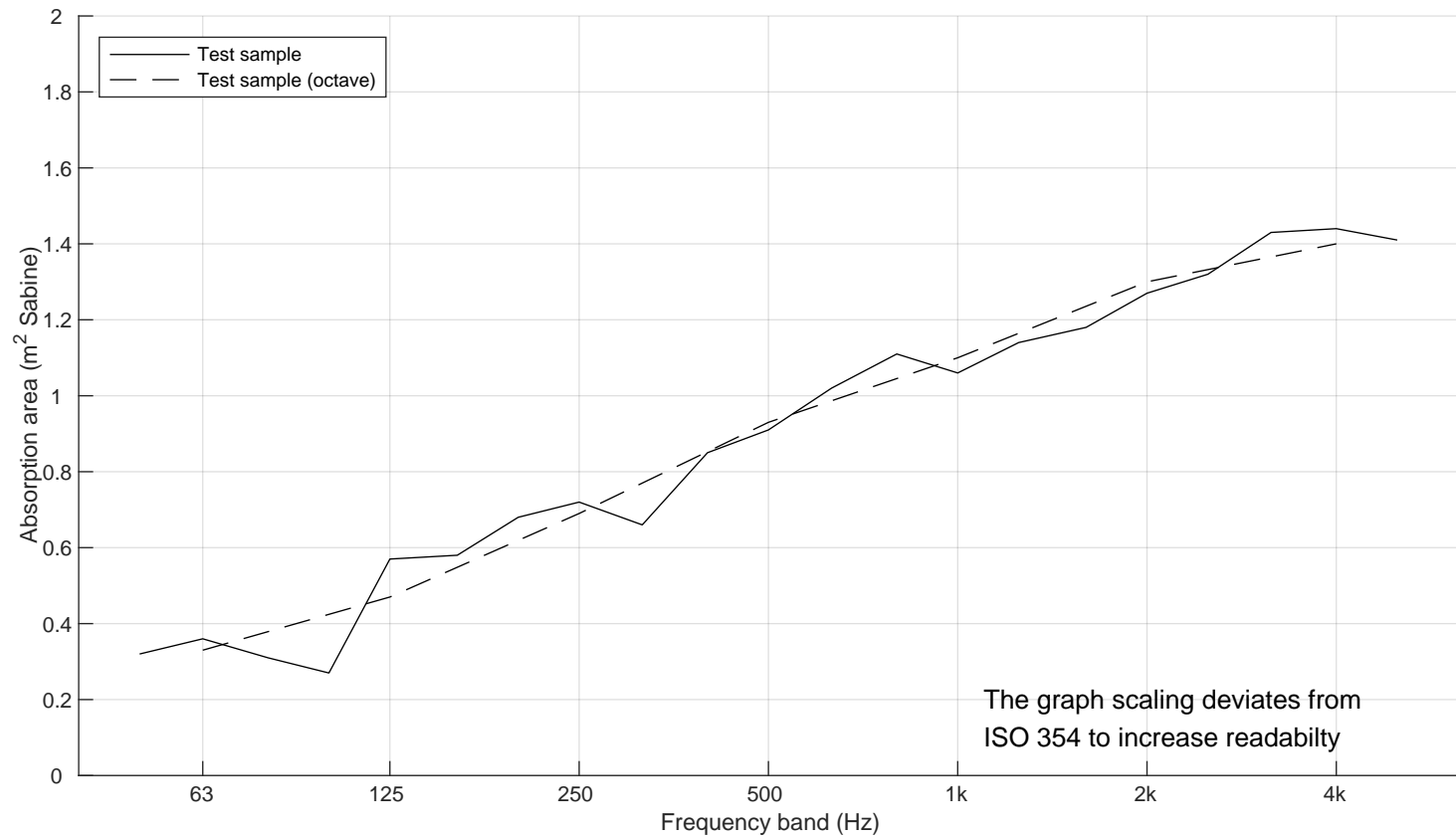
Client: Götessons industri AB
 Manufacturer: Götessons industri AB
 Product identification: ScreenIT Silent 1800 x 650

Description of test specimen: Desk screen 1800 x 650 x 32 mm.
 Mounted standing on floor.

Reverberation room volume: 200 m³
 Temperature: 19.6 °C (empty: 20.5 °C)
 Air humidity: 45 % (empty: 44 %)
 Air pressure: 100.2 kPa (empty: 100.2 kPa)
 Number of specimens: 3

Measurement date: 2020-10-14
 Measured by: Carl Nyqvist

$N_{10} = 11$



ScreenIT Silent 1800 x 800

SOUND ABSORPTION AREA ACCORDING TO SS-EN ISO 354:2003, SS 25269:2013 and ISO 20189:2018

Measurement of sound absorption area in a reverberation room



Report number:
20-738-M4
Date
2020-10-23

Frequency f [Hz]	Sound absorption area [m ² Sabine]	
50	0.40	
63	0.45	0.40
80	0.36	
100	0.33	
125	0.67	0.53
160	0.58	
200	0.77	
250	0.81	0.79
315	0.79	
400	1.08	
500	1.20	1.2
630	1.35	
800	1.51	
1000	1.56	1.5
1250	1.55	
1600	1.69	
2000	1.79	1.8
2500	1.89	
3150	1.86	
4000	2.02	1.9
5000	1.96	

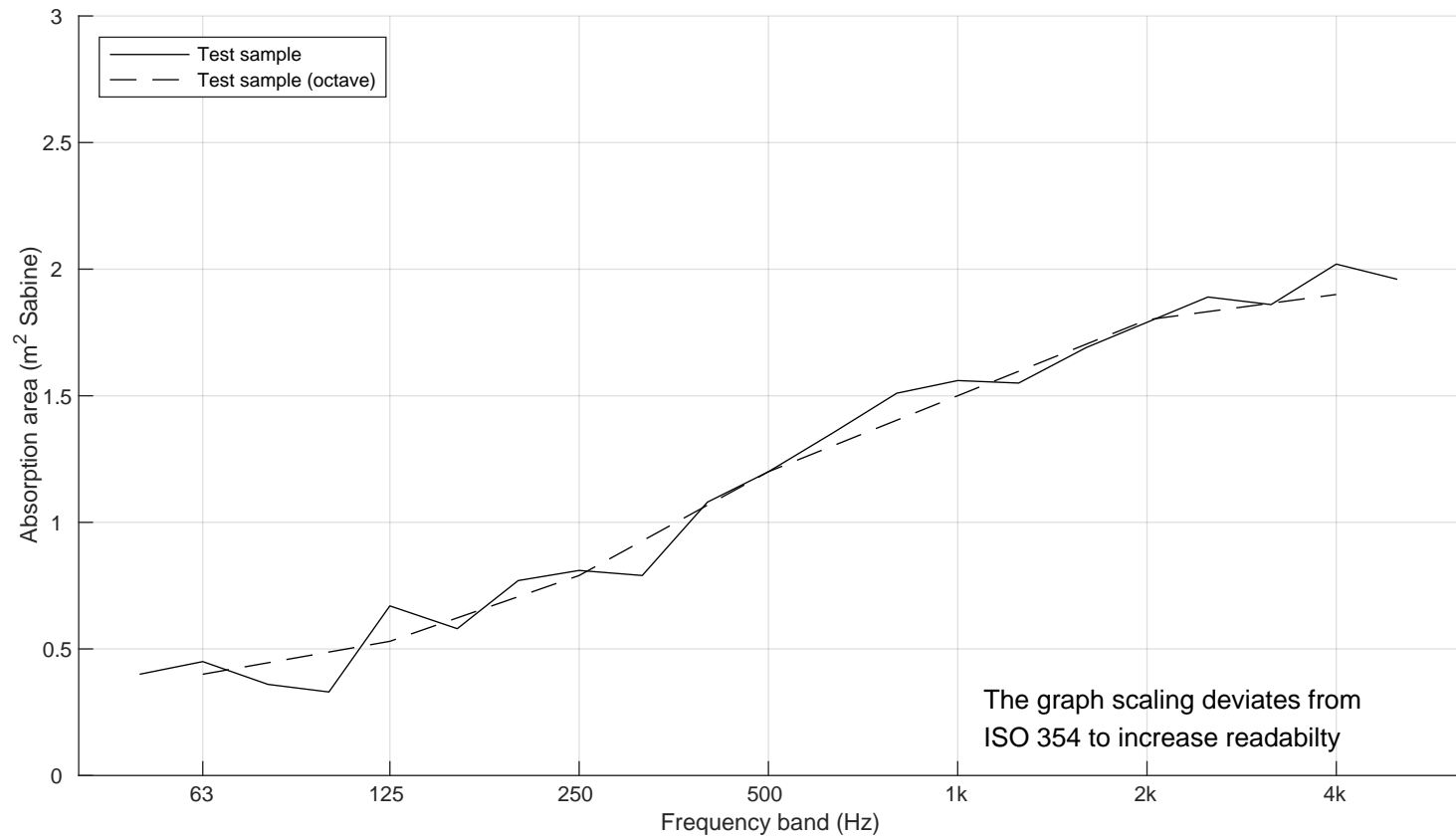
Client: Götessons industri AB
 Manufacturer: Götessons industri AB
 Product identification: ScreenIT Silent 1800 x 800

Description of test specimen: Desk screen 1800 x 800 x 32 mm.
 Mounted standing on floor.

Reverberation room volume: 200 m³
 Temperature: 19.3 °C (empty: 20.5 °C)
 Air humidity: 46 % (empty: 44 %)
 Air pressure: 100.2 kPa (empty: 100.2 kPa)
 Number of specimens: 3

Measurement date: 2020-10-14
 Measured by: Carl Nyqvist

$N_{10} = 8.3$



ScreenIT Silent 800 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

Report number:
20-738-M5
Date
2020-10-23

Frequency f [Hz]	Sound absorption area per object [m ² Sabine]	
50	0.18	
63	0.21	0.19
80	0.18	
100	0.14	
125	0.37	0.29
160	0.37	
200	0.40	
250	0.40	0.39
315	0.36	
400	0.49	
500	0.50	0.51
630	0.54	
800	0.62	
1000	0.62	0.63
1250	0.64	
1600	0.66	
2000	0.73	0.72
2500	0.76	
3150	0.81	
4000	0.82	0.83
5000	0.86	

Client: Götessons industri AB
 Manufacturer: Götessons industri AB
 Product identification: ScreenIT Silent 800 x 800

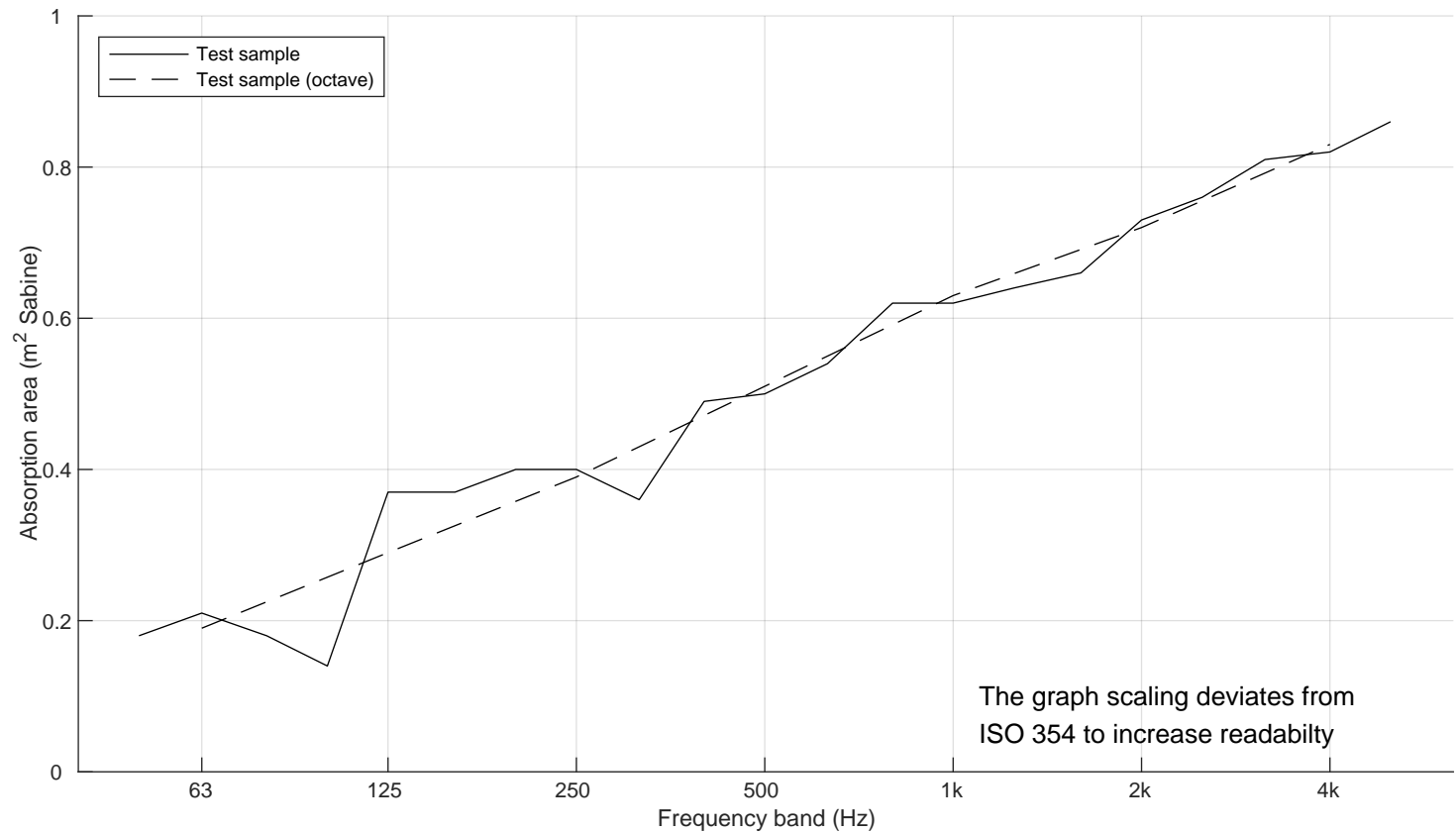
Description of test specimen: Desk screen 800 x 800 x 32 mm.

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

20-738-M1.txt
 and
 20-738-M2.txt

	Height	Width
Object 1 size	650	800
Object 2 size	650	1400
Interpolated object size	800	800
Area difference 19 %		

$N_{10} = 20$



ScreenIT Silent 1600 x 650

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:
20-738-M6
Date
2020-10-23

Frequency f [Hz]	Sound absorption area per object [m ² Sabine]	
50	0.30	
63	0.33	0.30
80	0.28	
100	0.24	
125	0.51	0.42
160	0.52	
200	0.63	
250	0.65	0.62
315	0.58	
400	0.77	
500	0.80	0.83
630	0.91	
800	0.99	
1000	0.96	0.99
1250	1.02	
1600	1.04	
2000	1.16	1.1
2500	1.21	
3150	1.28	
4000	1.31	1.3
5000	1.32	

$N_{10} = 12$

Client: Götessons industri AB
 Manufacturer: Götessons industri AB
 Product identification: ScreenIT Silent 1600 x 650

Description of test specimen: Desk screen 1600 x 650 x 32 mm.

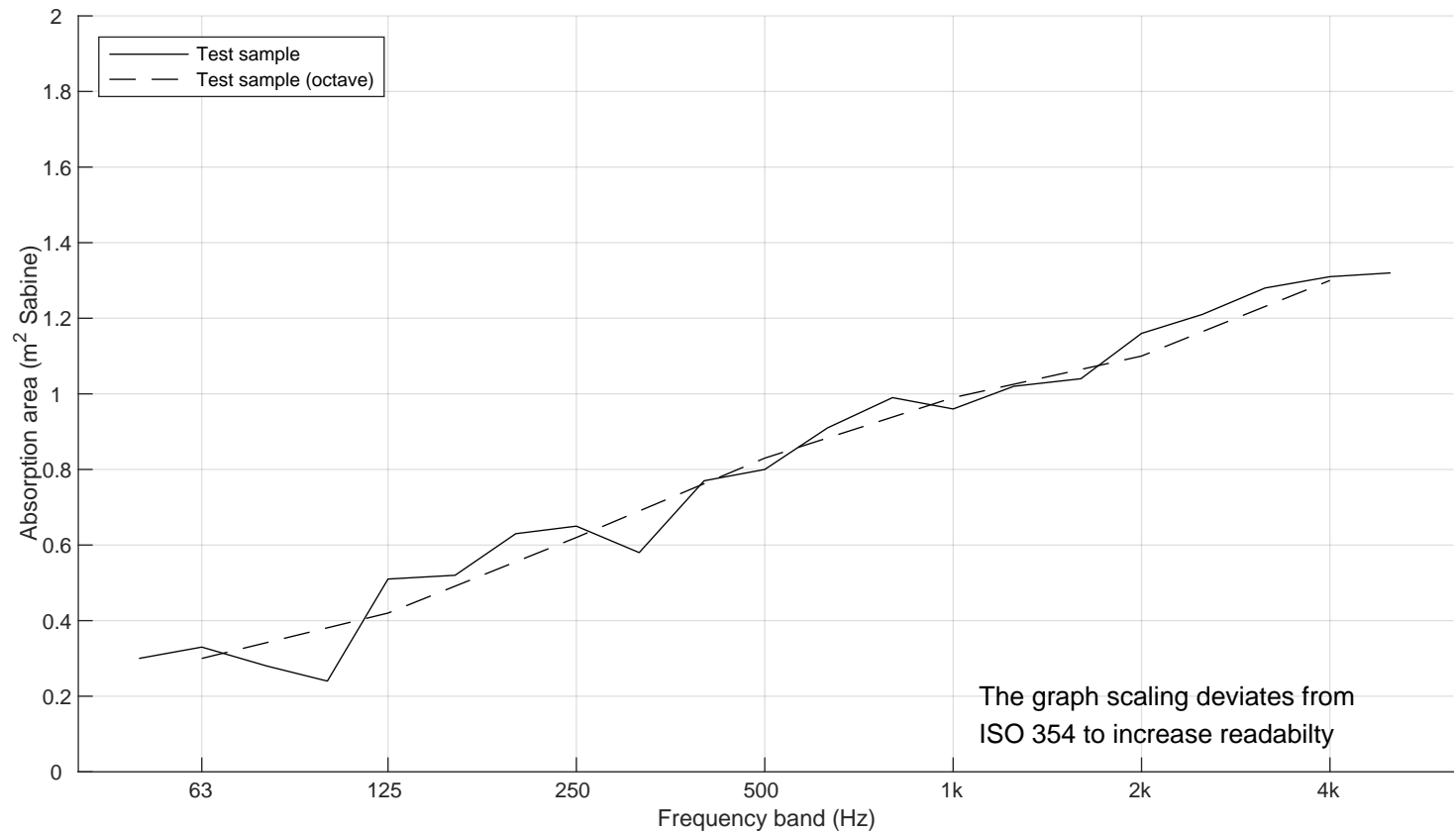
Interpolation according to ISO 20189:2018
 appendix E, based on measurements:

20-738-M2.txt

and

20-738-M3.txt

	Height	Width
Object 1 size	650	1400
Object 2 size	650	1800
Interpolated object size	650	1600
Area difference 11 %		



ScreenIT Silent 1400 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

Report number:
20-738-M7
Date
2020-10-23

Frequency f [Hz]	Sound absorption area per object [m ² Sabine]	
50	0.31	
63	0.35	0.32
80	0.30	
100	0.26	
125	0.55	0.46
160	0.56	
200	0.66	
250	0.69	0.66
315	0.63	
400	0.82	
500	0.87	0.89
630	0.98	
800	1.06	
1000	1.02	1.1
1250	1.10	
1600	1.13	
2000	1.23	1.2
2500	1.28	
3150	1.37	
4000	1.39	1.4
5000	1.38	

Client: Götessons industri AB
 Manufacturer: Götessons industri AB
 Product identification: ScreenIT Silent 1400 x 800

Description of test specimen: Desk screen 1400 x 800 x 32 mm.

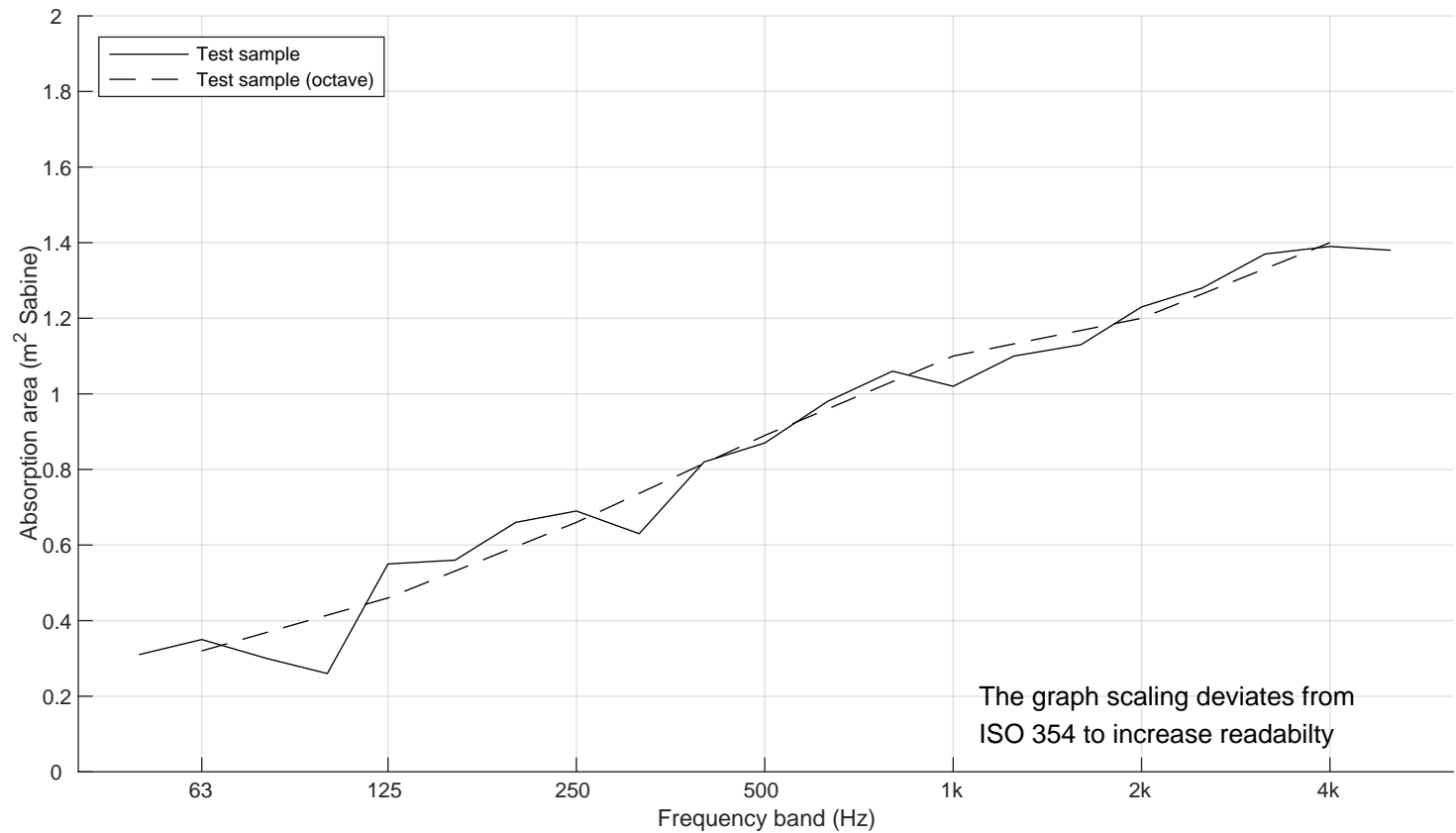
Interpolation according to ISO 20189:2018
 appendix E, based on measurements:

20-738-M2.txt
 and
 20-738-M3.txt

	Height	Width
Object 1 size	650	1400
Object 2 size	650	1800
Interpolated object size	800	1400

Area difference 4 %

$N_{10} = 11$



ScreenIT Silent 1600 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

Report number:
20-738-M8
Date
2020-10-23

Frequency f [Hz]	Sound absorption area per object [m ² Sabine]	
50	0.35	
63	0.40	0.36
80	0.33	
100	0.29	
125	0.61	0.49
160	0.58	
200	0.72	
250	0.76	0.73
315	0.71	
400	0.94	
500	1.03	1.0
630	1.15	
800	1.27	
1000	1.26	1.3
1250	1.31	
1600	1.39	
2000	1.48	1.5
2500	1.55	
3150	1.61	
4000	1.68	1.6
5000	1.63	

Client: Götessons industri AB
 Manufacturer: Götessons industri AB
 Product identification: ScreenIT Silent 1600 x 800

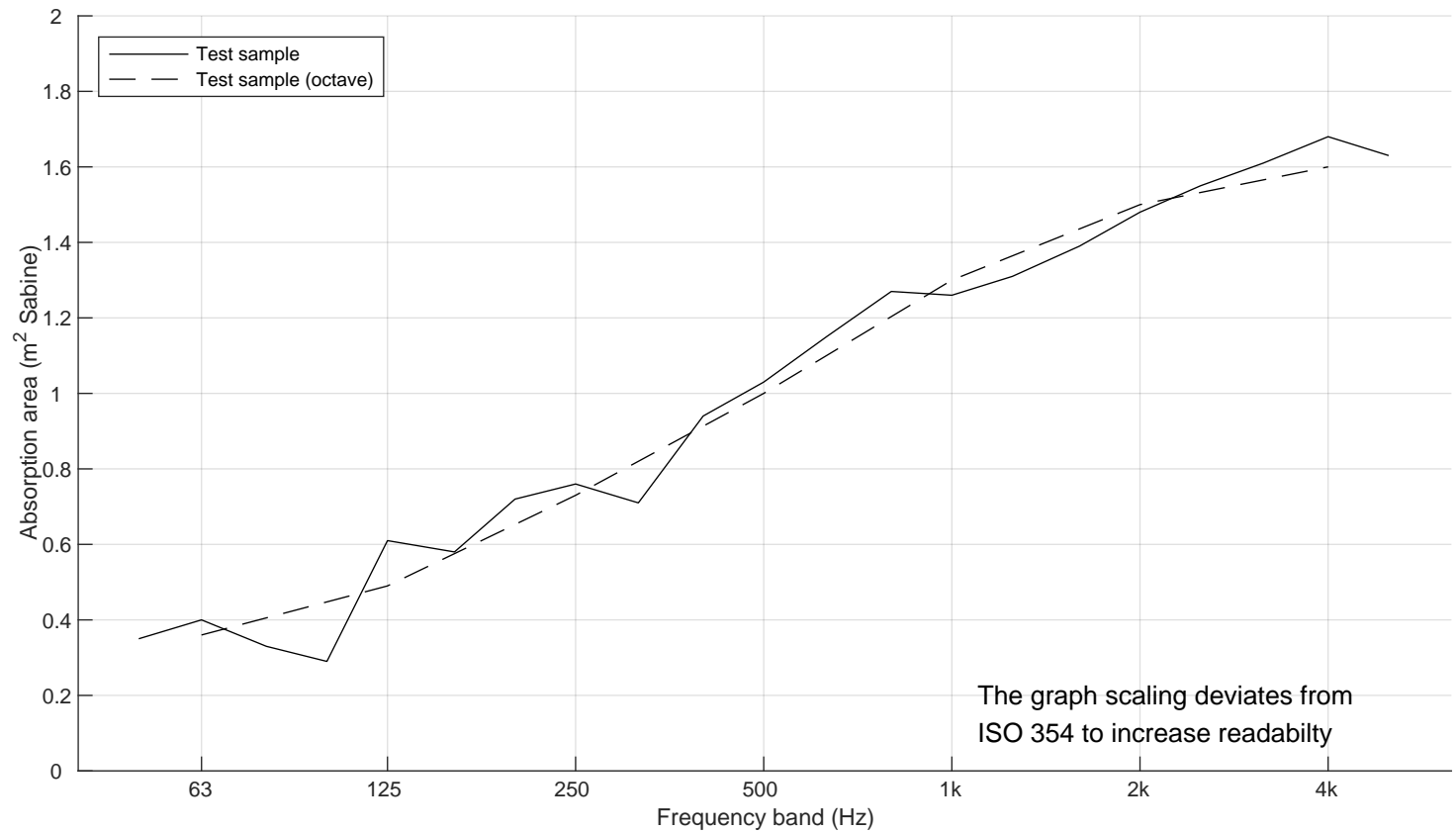
Description of test specimen: Table Screen 1600 x 800 x 32 mm.

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

20-738-M3.txt
 and
 20-738-M4.txt

	Height	Width
Object 1 size	650	1800
Object 2 size	800	1800
Interpolated object size	800	1600

Area difference 9 %



$N_{10} = 10$