REPORT
issued by an Accredited Testing Laboratory

Contact person
Geir Andresen
Energy Technology
+46 10 516 52 32
geir.andresen@sp.se

Date 2014-03-27 Reference 4P00541C/Eng

SWEDAC ACKREDITERING 1002 ISO/IEC 17025

Götessons Industri AB
Fredrik Stjerna
Växtorpsvägen 6
514 61 DALSTORP

Determination of sound absorption of a office screen according to ISO 354, SS-25269 and EN ISO 11654

(3 appendices)

This report is a translation from the Swedish original document. In the event of any dispute as to the content of the document, the Swedish text shall take precedence.

Client

Götessons Industri AB

Test object

SP has on assignment from Götessons Industri AB carried out accredited sound absorption measurements of office screens of type ScreenIT A40/Frequency.

The test object consist of two screens which were mounted towards each other with 30 mm air gap between the screens

Each single screen had the dimensions: 1200 mm x 1800 mm x 50 mm and the area mass was 6,5 kg/m² excluding the standings. According to information from the client the material of the panels was of type PET-fibre. The test was made with three combinations of objects mounted in the reverberation room. The total double sided area of the objects was 12,96 m², which means 4,32 m²/object.

Date of arrival of test date

February 27, 2014.

Results

The equivalent sound absorption area (A_{obj}) in the octave bands 125-4000 Hz calculated according to Swedish standard SS-25269 is given in table 1. The equivalent sound absorption area (A_{obj}) in the third-octave bands 50-5000 Hz are given in appendix 1.

On request from the client the sound absorption coefficient (αS) and the practical sound absorption coefficient (α_p) are given in the enclosures 2 and 3. The weighted sound absorption coefficient (α_w) and the sound absorption classes have been calculated according to ISO 11654 and the results are given in table 2. The results are valid for tested objects only.

Note that the sound absorption coefficient and class, given in table 2 and in the enclosures 2 and 3 follow the rules for plane absorbers mounted against a surface according to EN ISO 354 and EN ISO 11654. Results for free standing objects like office screens should be equivalent sound absorption area according to ISO 354 and SS-25269 as above.

Table 1 – Summary of equivalent sound absorption area per single screen according to SS-25269.

Test object: ScreenIT A40/Frequency	Absorptionsarea per provobjekt i oktavband, (A_{obj} m^{2}Sabine)						Bilaga
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	
Two screens were mounted towards each other with 30 mm air gap between the screens.	1,8	3,1	4,1	4,3	4,3	4,2	1

Tabell 2 – Summary of equivalent sound absorption area

Test object: ScreenIT A40/Frequency	ISO 11654		Bilaga
	Abs. klass	α_w	
Two screens were mounted towards each other with 30 mm air gap between the screens	A	0,95	2-3

Figure 1. The figure shows the test set up, where three couples of screens were mounted toward each other with 30 mm air gap between the screens.

Measurement method

The measurements have been carried out according to ISO 354:2003, which is equivalent to EN ISO 354 and SS-EN ISO 354. The evaluation has been carried out according to ISO 11654, which is equivalent to EN ISO 11654 and SS-EN ISO 11654. Furthermore, the screens have been evaluated according to SS 25269:2013. 4 loudspeaker positions and 6 microphone positions have been used giving 24 different combinations for the reverberation time measurements. For empty room 3 decays have been used for averaging the time and for test objects 5 decays have been used, for each combination of loudspeaker and microphone.

The absorption coefficient α_S has been evaluated from:

$$\alpha_S = \frac{55.3\,V}{c \cdot S}\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$$

where

V = Volume of the reverberation room (m^3)
S = Area of the test object (m^2)
c = Speed of sound in air (m/s)
c = 331 + 0.6t
t = Temperature in the air (°C)
T_1 = Reverberation time of the room without test object (s)
T_2 = Reverberation time of the room with test object (s)

Measurement uncertainty

From a world wide Round Robin[1)], in which SP took part, with 23 participating laboratories from 11 countries, the measurement uncertainties in table 2 has been calculated.

Table 2

Frequencies (Hz)	Uncertainty
100-630	± 0,15
800-1250	± 0,10
1600-2500	± 0,15
3150-5000	± 0,20

[1)] The figures are calculated from twice the standard deviations, rounded to the nearest 0,05. The data from the Round Robin is documented in a letter from the ASTM to the participating laboratories.

Test room

A reverberation room with the dimensions 7,64 m x 6,16 m x 4,25 m giving the volume 200 m^3 and the total surface area 211 m^2 was used.

Mounting

The office screen elements were positioned in a reverberation room as shown on picture 1. They were at least 2 m apart and their distance to the nearest wall was at least 1 m.

List of instruments

Instrument	Manufacturer	Type	Serial no
Microphone	Brüel & Kjaer	4943	A700440
Microphone	Brüel & Kjaer	4943	2479445
Microphone	Brüel & Kjaer	4943	2206273
Microphone	Brüel & Kjaer	4943	2206274
Microphone	Brüel & Kjaer	4943	2206276
Microphone	Brüel & Kjaer	4943	2206277
Microphone Preamplifier	Brüel & Kjaer	2619	2206278
Microphone Preamplifier	Brüel & Kjaer	2619	970948
Microphone Preamplifier	Brüel & Kjaer	2619	726624
Microphone Preamplifier	Brüel & Kjaer	2619	469905
Microphone Preamplifier	Brüel & Kjaer	2619	726792
Microphone Preamplifier	Brüel & Kjaer	2619	726825
Microphone Multiplexer	Norsonic	834	10050
Real-Time Analyzer	Norsonic	830	11533
Sound Level Calibrator	Brüel & Kjaer	4230	1411048
Programme	SP	Absorp 960627	
Power amplifier	PA1		
Noise generator	NG1 (white noise)		
Loudspeakers	SP	HGT2, HGT7, HGT4, HGTtak	
Hygrometer/ Temperature meter	Testo	615	502233

SP Technical Research Institute of Sweden
Energy Technology - Acoustics

Performed by

Geir Andresen

Examined by

Joachim Stadig

3 appendices