



REPORT

issued by an Accredited Testing Laboratory

Contact person
Joachim Stadig
Sustainable Built Environment
+46 10 516 54 29
joachim.stadig@sp.se

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Carles Strand Design AB
Charles Strand
J A Pripps Gata 2
421 32 VÄSTRA FRÖLUNDA

Determination of sound absorption area of office screens according to EN ISO 354 and SS 25269

Client

Carles Strand Design AB

Test object

A type of armchair.

Pictures of the armchair are shown in the report.

Arrival of test objects

Just before the test

Date of test

July 26, 2016

Results

The equivalent sound absorption area is given per object (A_{obj}) in 1/3 octave bands in table 1.

The sound absorption area per object in octave bands according to SS 25269 is given in table 2.

SP Technical Research Institute of Sweden

Postal address

SP
Box 857
SE-501 15 BORÅS
Sweden

Office location

Västeråsen
Brinellgatan 4
SE-504 62 BORÅS

Phone / Fax / E-mail

+46 10 516 50 00
+46 33 13 55 02
info@sp.se

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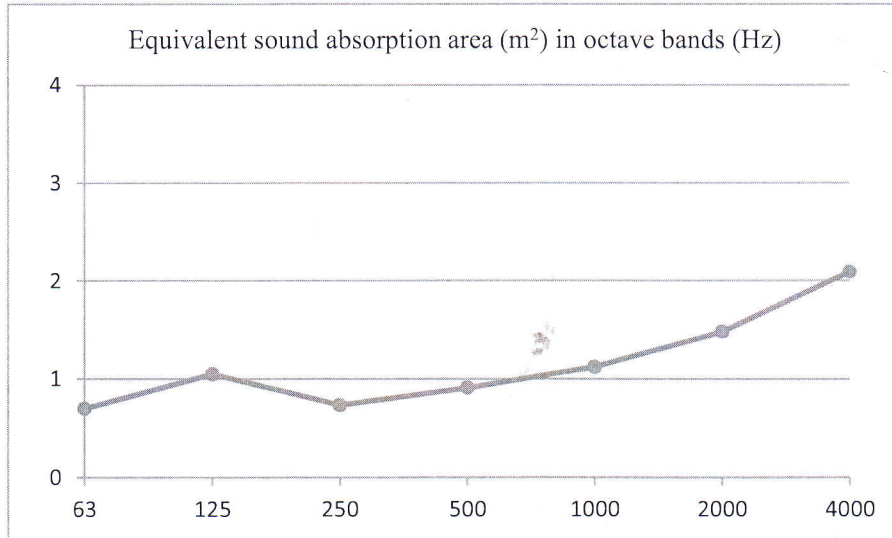
Table 1 – The equivalent sound absorption area A_{obj} in square meter (m^2) per single object.

1/3-octave band	One “armchair” (m^2)
50	0,12
63	0,61
80	1,36
100	1,77
125	0,71
160	0,67
200	0,66
250	0,71
315	0,83
400	0,85
500	0,90
630	0,98
800	1,06
1000	1,13
1250	1,16
1600	1,33
2000	1,45
2500	1,67
3150	1,87
4000	2,10
5000	2,31
6300	2,56
8000	2,57
10000	2,54

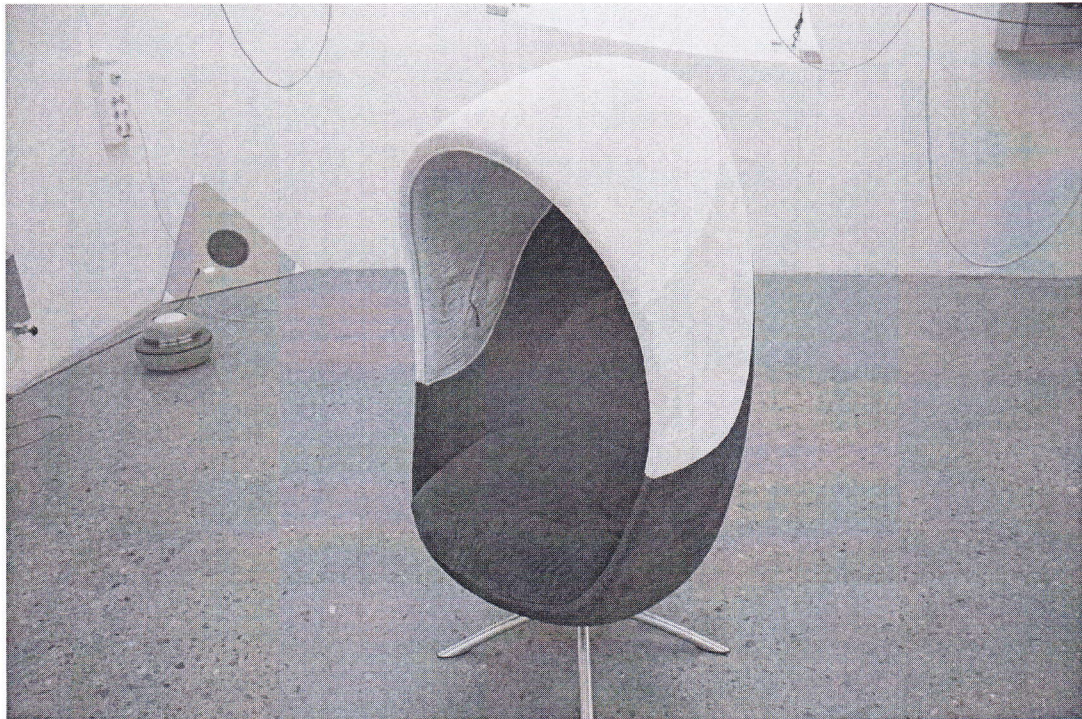
Table 2 – The equivalent sound absorption area in square meter (m^2) per single object.

Octave band	One “armchair” (m^2)
63	0,70
125	1,05
250	0,73
500	0,91
1000	1,12
2000	1,48
4000	2,09

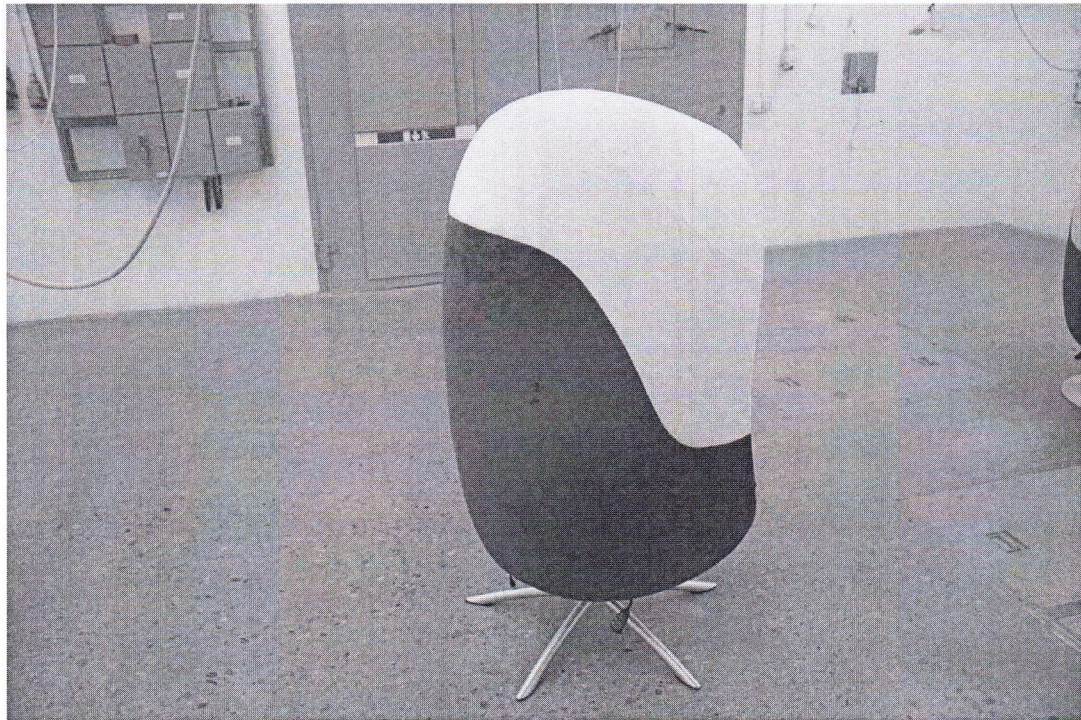
Graph 1 – “One armchair”



Pictures of the test objects



Picture 1 – The type of armchair.



Picture 2 – The type of armchair.

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 requirement of the standard regarding equivalent sound absorption of the test objects were not fulfilled at the 1/3-octave band 125 Hz for the “L”-shaped objects.

The evaluation has been carried out according to ISO 354 and SS25269. 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 equivalent sound absorption area per object A_{obj} has been evaluated from:

$$A_{obj} = \frac{55.3 V}{c \cdot n} \left(\frac{1}{T_2} - \frac{1}{T_1} \right)$$

where

- V = Volume of the reverberation room (m³)
- n = Number of test objects
- c = Speed of sound in air (m/s)
- c = 331 + 0.6t
- t = Temperature in the air (°C)
- T₁ = Reverberation time of the room without test object (s)
- T₂ = Reverberation time of the room with test object (s)

Measurement uncertainty

From a world wide Round Robin¹⁾, in which SP took part, with 23 participating laboratories from 11 countries, the following measurement uncertainty has been calculated:

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 m³ and the total surface area 211 m² was used. The suspended diffusers have been arranged according to ISO 354.

Mounting

Three armchairs of the same type were placed 2 m apart in a reverberation room during the measurement.

List of instruments

Instrument	Manufacturer	Type	Serial no/SP no.
Microphone	Brüel & Kjaer	4943	2749979
Microphone	Brüel & Kjaer	4943	2206273
Microphone	Brüel & Kjaer	4943	2206274
Microphone	Brüel & Kjaer	4943	2206276
Microphone	Brüel & Kjaer	4943	2206277
Microphone	Brüel & Kjaer	4943	2206278
Microphone Preamplifier	Brüel & Kjaer	2619	726818
Microphone Preamplifier	Brüel & Kjaer	2619	726624
Microphone Preamplifier	Brüel & Kjaer	2619	469905
Microphone Preamplifier	Brüel & Kjaer	2619	726792
Microphone Preamplifier	Brüel & Kjaer	2619	970865
Microphone Preamplifier	Brüel & Kjaer	2619	970968
Microphone Multiplexer	Norsonic	834	10050
Real-Time Analyzer	Norsonic	830	11533
Sound Level Calibrator	Brüel & Kjaer	4230	1411048
Programme	SP	Absorp 960627	
Hygrometer/ Temperature meter	Testo	615	503962



SP Technical Research Institute of Sweden
Sustainable Built Environment - Sound and vibration

Performed by

Examined by

Signed by: Joachim Stadig
Reason: I am the author of this document
Date & Time: 2016-08-08 16:57:51 +02:00

Joachim Stadig

Signed by: Mark Kartous
Reason: I have reviewed this document
Date & Time: 2016-08-09 08:24:07 +02:00

Mark Kartous