1002
ISO/IEC 17025

REPORT
issued by an Accredited Laboratory

Date 2005-11-22 | Reference P504551-B | Page 1 (4)

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Determination of sound absorption coefficients of an office screen in a reverberation room according to ISO 354 and NT ACOU 085

(2 appendices)

Client

Abstracta AB

Test objects

Three office screens designated: SOFTLINE

The dimensions of the screen elements were: height: 1,70 m, width: 1,00 m.
The screen had a 0,10 m gap between the floor and the underside of the screen.

The office screen was absorptive on both sides. Three screens were tested.

Arrival of test objects

November 9, 2005

Date of test

November 15, 2005

Results

The sound absorption coefficient (α_S) are given in enclosure 1. The weighted sound absorption coefficient (α_W) and the sound absorption classes have been calculated according to NT ACOU 085 and can be seen in table 1. The result is valid for the tested objects only.

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Table 1 - Summary of results

Office screen:	NT ACOU 085		Enclosure
	Absorption class	α_W	
SOFTLINE	A	0,90	1

Measurement method

The measurements have been carried out according to ISO 354:1985 and SS 02 52 61. The evaluation is based on NT ACOU 085. 4 loudspeakers and 6 microphones have been used giving 24 different combinations. 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:

$$\alpha_S = \frac{55{,}3V}{c \cdot S}\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$$

where

V = Volume of the reverberation room (m³)
S = Area of the test object (m²)
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 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.

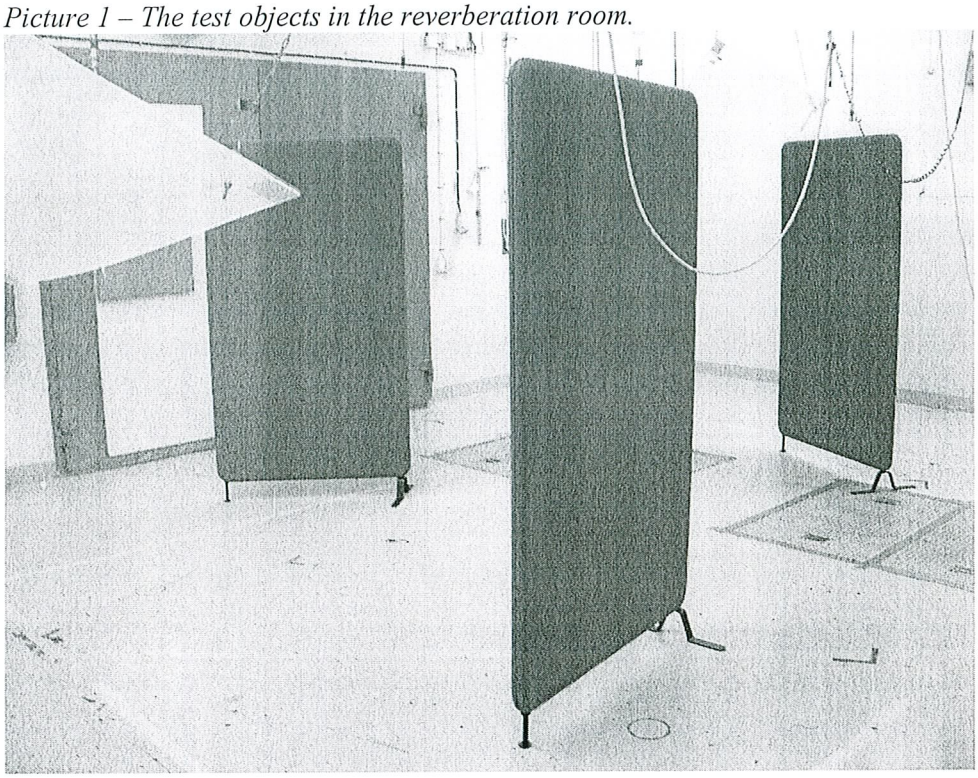
Test room

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 the Nordtest method NT ACOU 012 and SS-ISO 354.

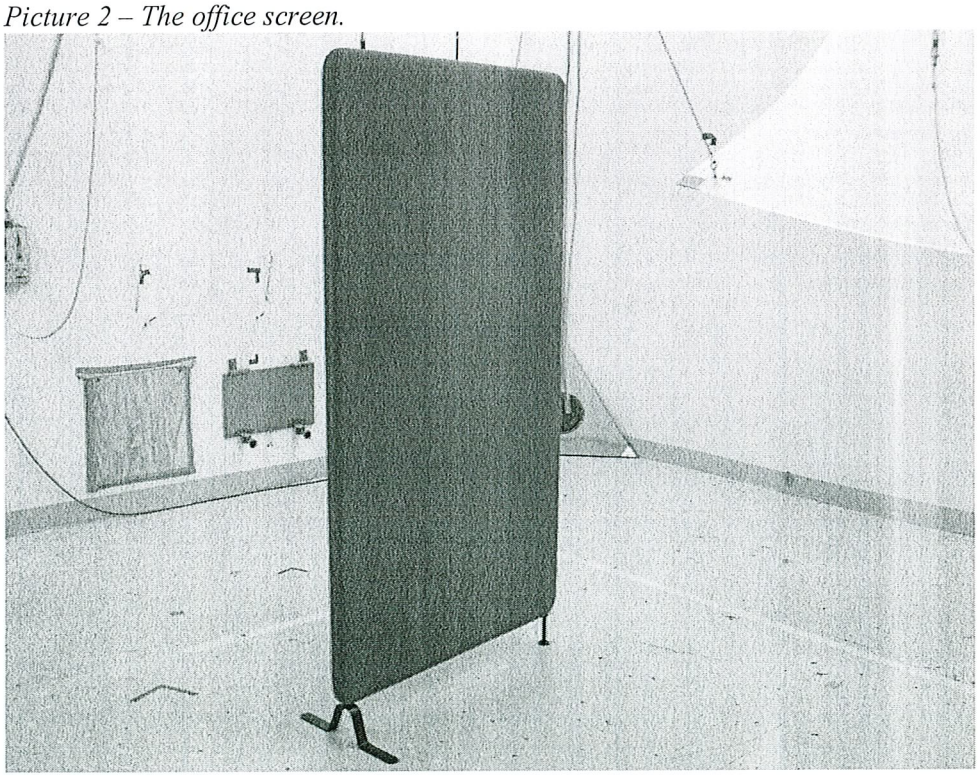
Mounting

The office screen elements were placed in a reverberation room. They had a distance of at least 1 m to the nearest wall.

Picture 1 – The test objects in the reverberation room.



Picture 2 – The office screen.



List of instruments

Instrument	Manufacturer	Type	SP no / Serial no
Microphone	Brüel & Kjaer	4943	503327
Microphone	Brüel & Kjaer	4943	503326
Microphone	Brüel & Kjaer	4943	503325
Microphone	Brüel & Kjaer	4943	503324
Microphone	Brüel & Kjaer	4943	503323
Microphone	Brüel & Kjaer	4166	500736
Microphone Preamplifier	Brüel & Kjaer	2619	970996
Microphone Preamplifier	Brüel & Kjaer	2619	970948
Microphone Preamplifier	Brüel & Kjaer	2619	469905
Microphone Preamplifier	Brüel & Kjaer	2619	726792
Microphone Preamplifier	Brüel & Kjaer	2619	726825
Microphone Preamplifier	Brüel & Kjaer	2619	970968
Microphone Multiplexer	Norsonic	834	10050
Real-Time Analyzer	Norsonic	830	11533
Sound Level Calibrator	Brüel & Kjaer	4230	1410947
Programme	SP	Absorp	960627
Power amplifier	PA1		
Noise generator	NG1 (white noise)		
Loudspeakers	SP	HGT2, HGT7, HGT4, HGTtak	
Hygrometer	Vaisala	HM 132	42154
Temperature meter	Vaisala	HM 132	42154

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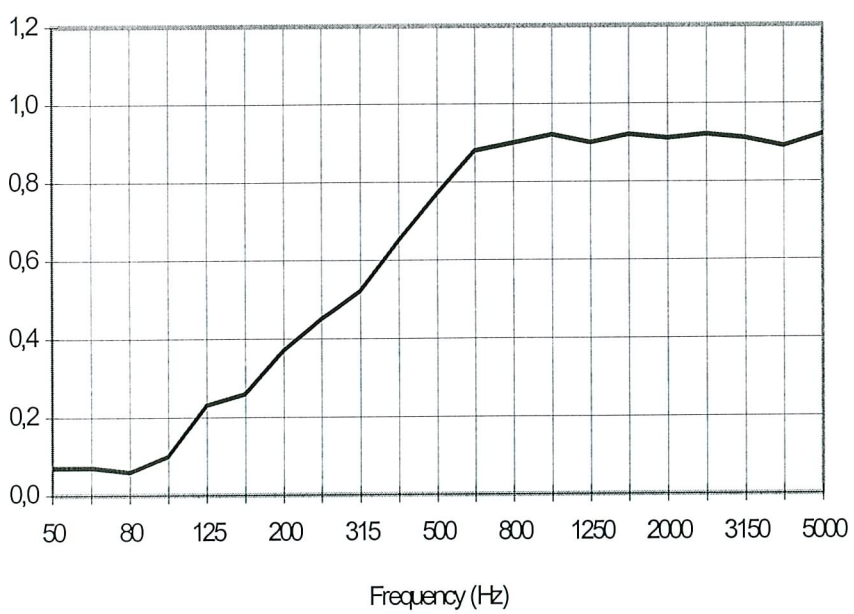
Appendices

Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Abstracta AB
Object	Office screens designated: SOFTLINE Height: 1,70 m, width: 1,00 m. The screens had a 0,10 m gap between the floor and the underside of the screen.
Date of test	November 15, 2005
Conditions	Two-sided surface area: 10,20 m^2 (3 office screens). Room volume: 200 m^3. Temperature at measurement on object/in empty room: 20/ 20 °C. Relative humidity at measurement on object/in empty room: 82/ 82 %.
Result	*Sound absorption class according to NT ACOU 085:* ***A*** *Weighted sound absorption coefficient α_W, according to NT ACOU 085:* ***0,90***

Sound absorption class C according to EN ISO 11654.
Weighted sound absorption coefficient α_w = 0,75(H) according to EN ISO 11654

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,07
63	0,07
80	0,06
100	0,10
125	0,23
160	0,26
200	0,37
250	0,45
315	0,52
400	0,65
500	0,77
630	0,88
800	0,90
1000	0,92
1250	0,90
1600	0,92
2000	0,91
2500	0,92
3150	0,91
4000	0,89
5000	0,92

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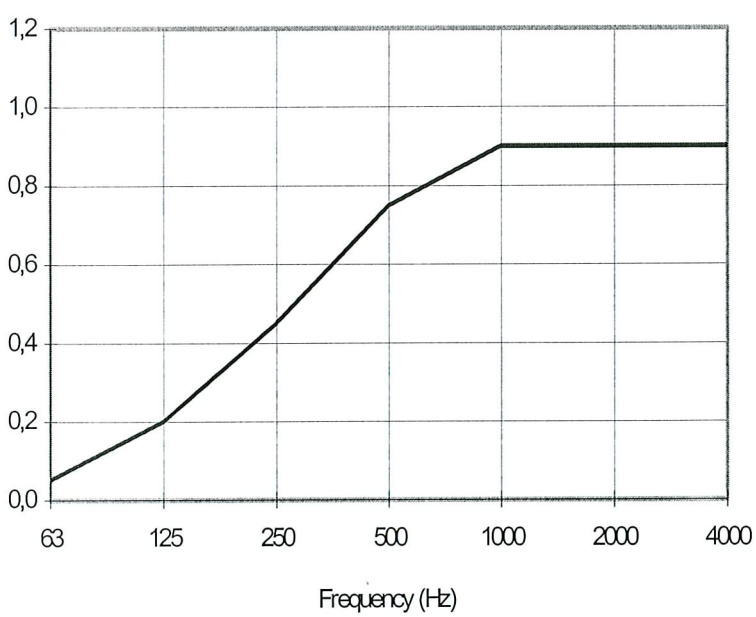
Practical sound absorption coefficient



Frequency (Hz)	α_p
63	0,05
125	0,20
250	0,45
500	0,75
1000	0,90
2000	0,90
4000	0,90