REPORT
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1002

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Datum/*Date*: January 12, 2000

Beteckning/*Reference*: 99F34779-E

Sida/*Page*: 1 (6)

Determination of sound absorption coefficients in a reverberation room according to ISO 354 and ISO 11654

(50 enclosures)

Test object

Absorbing panels delivered by Gustafs Inredningar i Dalarna AB.

Date of test

December 27-30

Date of arrival

The test object arrived in connection with the test.

Results

The sound absorption coefficient α and the practical sound absorption coefficient α_p are given in enclosures 1-50. The weighted sound absorption coefficient α_w and the sound absorption classes have been calculated according to EN ISO 11654 and the result are given in table 1-3.

Table 1 - Summary of results

Test object:	EN ISO 11654		Enclosure
	Absorption class	α_w	
Gustafs BF-Panel PH8 without acoustic felt Mounting depth: 35 mm	E	0,15	1-2
Gustafs BF-Panel PH8 with acoustic felt Mounting depth: 35 mm	D	0,35(MH)	3-4
Gustafs BF-Panel PH8 with acoustic felt, mineral wool and 30 mm air gap Mounting depth: 82,5 mm	D	0,55(LM)	5-6
Gustafs BF-Panel PH10 with acoustic felt, mineral wool and 30 mm air gap Mounting depth: 82,5 mm	C	0,7(LM)	7-8
Gustafs BF-Panel PD8 with acoustic felt, mineral wool and 30 mm air gap Mounting depth: 82,5 mm	B	0,8	9-10
Gustafs BF-Panel SG8 with acoustic felt, mineral wool and 30 mm air gap Mounting depth: 82,5 mm	C	0,65(LM)	11-12
Gustafs BF-Panel SH8 with acoustic felt, mineral wool and 30 mm air gap Mounting depth: 82,5 mm	C	0,75(LM)	13-14
Gustafs BF-Panel SG5 with acoustic felt, mineral wool and 30 mm air gap Mounting depth: 82,5 mm	D	0,5(LM)	15-16
Gustafs BF-Panel SH5 with acoustic felt, mineral wool and 30 mm air gap Mounting depth: 82,5 mm	C	0,6(LM)	17-18
Gustafs BF-Panel PG8 with acoustic felt, mineral wool and 30 mm air gap Mounting depth: 82,5 mm	D	0,45(LM)	19-20

Table 2 - Summary of results

Test object:	EN ISO 11654		Enclosure
	Absorption class	α_w	
Gustafs BF-Panel PG5 with acoustic felt, mineral wool and 30 mm air gap Mounting depth: 82,5 mm	E	0,25(LM)	21-22
Gustafs BF-Panel PH5 with acoustic felt, mineral wool and 30 mm air gap Mounting depth: 82,5 mm	D	0,3(LM)	23-24
Gustafs BF-Panel non-perforated with mineral wool and 30 mm air gap Mounting depth: 82,5 mm	No class	0,05	25-26
Gustafs BF-Panel non-perforated with mineral wool and 200 mm air gap Mounting depth: 252,5 mm	No class	0,05(L)	27-28
Gustafs BF-Panel PH5 with acoustic felt, mineral wool and 200 mm air gap Mounting depth: 252,5 mm	D	0,35(L)	29-30
Gustafs BF-Panel PG5 with acoustic felt, mineral wool and 200 mm air gap Mounting depth: 252,5 mm	D	0,3(L)	31-32
Gustafs BF-Panel PG8 with acoustic felt, mineral wool and 200 mm air gap Mounting depth: 252,5 mm	D	0,5(L)	33-34
Gustafs BF-Panel SH5 with acoustic felt, mineral wool and 200 mm air gap Mounting depth: 252,5 mm	D	0,5	35-36
Gustafs BF-Panel SG5 with acoustic felt, mineral wool and 200 mm air gap Mounting depth: 252,5 mm	D	0,55(LM)	37-38
Gustafs BF-Panel SH8 with acoustic felt, mineral wool and 200 mm air gap Mounting depth: 252,5 mm	C	0,75(L)	39-40

Table 3 - Summary of results

Test object:	EN ISO 11654		Enclosure
	Absorption class	α_w	
Gustafs BF-Panel SG8 with acoustic felt, mineral wool and 200 mm air gap Mounting depth: 252,5 mm	C	0,65(LM)	41-42
Gustafs BF-Panel PD8 with acoustic felt, mineral wool and 200 mm air gap Mounting depth: 252,5 mm	B	0,85(L)	43-44
Gustafs BF-Panel PH10 with acoustic felt, mineral wool and 200 mm air gap Mounting depth: 252,5 mm	C	0,75(L)	45-46
Gustafs BF-Panel PH8 with acoustic felt, mineral wool and 200 mm air gap Mounting depth: 252,5 mm	D	0,55(LM)	47-48
Gustafs BF-Panel PH8 with 200 mm air gap Mounting depth: 212,5 mm	D	0,5(LM)	49-50

Measurement method

The measurements have been carried out according to SS-EN 20354:93 (ISO 354:1985). 4 loudspeakers and 6 microphones (Brüel & Kjaer 4166) have been used giving 24 different combinations. Depending on the integration time (<T/20), 3-5 decays have been recorded with each microphone and loudspeaker combination. Ensemble averaging has been used.

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 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 panels were placed on the floor or in a frame with the size 3 x 3,6 m. The edges were sealed by a wooden frame and a tape (made of an elastic woven material) to prevent air leakage. The mounting depth is the distance between the floor and the front surface (upper) of the test objects. In table 1-3 and enclosure 1-50, the mounting depth is given for each test subject.

List of instruments

Instrument	Manufacturer	Type	Serial no
Microphone	Brüel & Kjaer	4166	1011668
Microphone	Brüel & Kjaer	4166	1011605
Microphone	Brüel & Kjaer	4166	1011610
Microphone	Brüel & Kjaer	4166	1011672
Microphone	Brüel & Kjaer	4166	1011722
Microphone	Brüel & Kjaer	4166	1072010
Microphone Preamplifier	Brüel & Kjaer	2619	726805
Microphone Preamplifier	Brüel & Kjaer	2619	726774
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

SP Swedish National Testing and Research Institute
Acoustics

Hans Jonasson
Technical manager

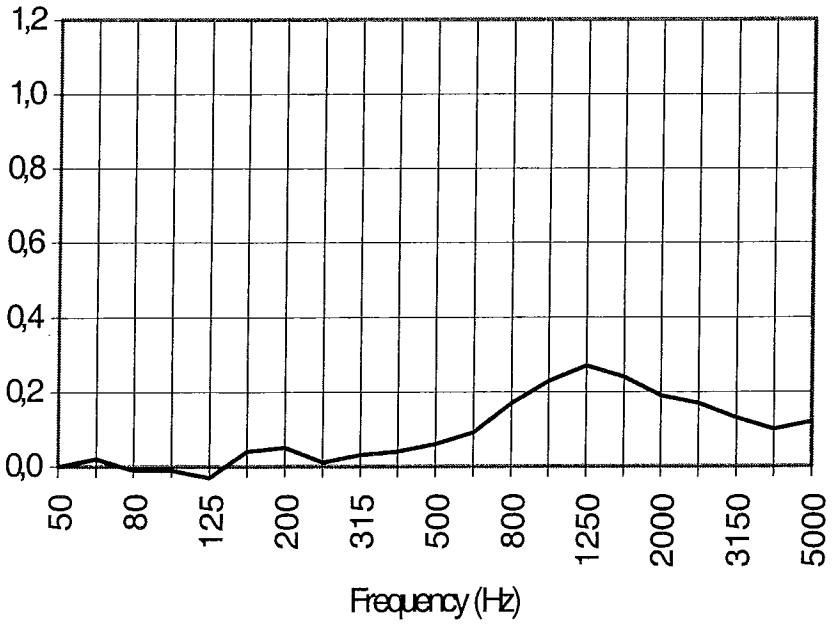
Joachim Stadig
Technical officer

January 12, 2000 99F34779-E Enclosure 1

Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel PH8 without acoustic felt Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 27, 1999
Conditions	Mounting depth: 35 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 85/ 86 %.
Result	Sound absorption class E according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,15 according to EN ISO 11654.

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,00
63	0,02
80	-0,01
100	-0,01
125	-0,03
160	0,04
200	0,05
250	0,01
315	0,03
400	0,04
500	0,06
630	0,09
800	0,17
1000	0,23
1250	0,27
1600	0,24
2000	0,19
2500	0,17
3150	0,13
4000	0,10
5000	0,12

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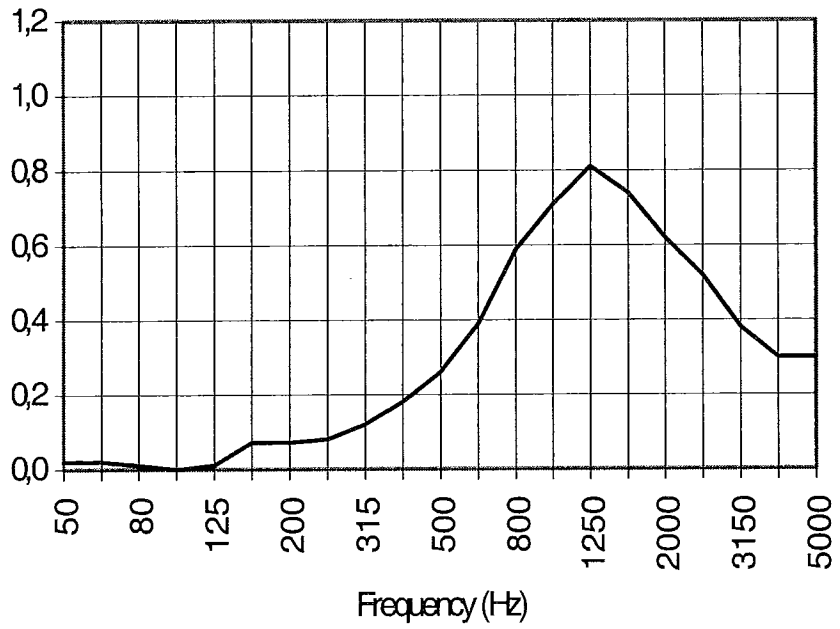
SP 511

Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel PH8 with acoustic felt Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 27, 1999
Conditions	Mounting depth: 35 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 87/ 86 %.
Result	Sound absorption class D according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,35(MH) according to EN ISO 11654.

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,02
63	0,02
80	0,01
100	0,00
125	0,01
160	0,07
200	0,07
250	0,08
315	0,12
400	0,18
500	0,26
630	0,39
800	0,59
1000	0,71
1250	0,81
1600	0,74
2000	0,62
2500	0,52
3150	0,38
4000	0,30
5000	0,30

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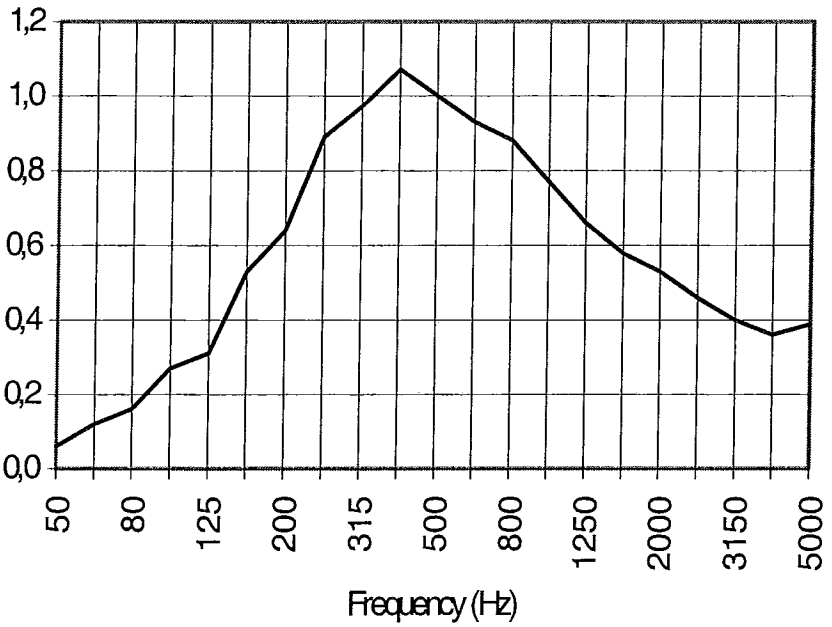
SP 511

Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel PH8 with acoustic felt, mineral wool and 30 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 27, 1999
Conditions	Mounting depth: 82,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 87/ 86 %.
Result	Sound absorption class D according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,55(LM) according to EN ISO 11654.

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,06
63	0,12
80	0,16
100	0,27
125	0,31
160	0,53
200	0,64
250	0,89
315	0,97
400	1,07
500	1,00
630	0,93
800	0,88
1000	0,77
1250	0,66
1600	0,58
2000	0,53
2500	0,46
3150	0,40
4000	0,36
5000	0,39

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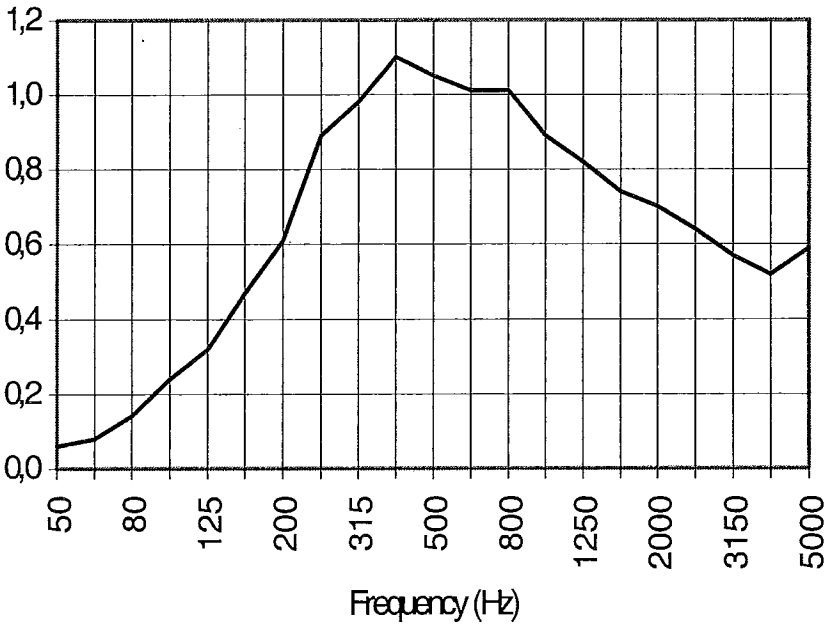
Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel PH10 with acoustic felt, mineral wool and 30 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 28, 1999
Conditions	Mounting depth: 82,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 87/ 86 %.
Result	Sound absorption class C according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,7(LM) according to EN ISO 11654.

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,06
63	0,08
80	0,14
100	0,24
125	0,32
160	0,47
200	0,61
250	0,89
315	0,98
400	1,10
500	1,05
630	1,01
800	1,01
1000	0,89
1250	0,82
1600	0,74
2000	0,70
2500	0,64
3150	0,57
4000	0,52
5000	0,59

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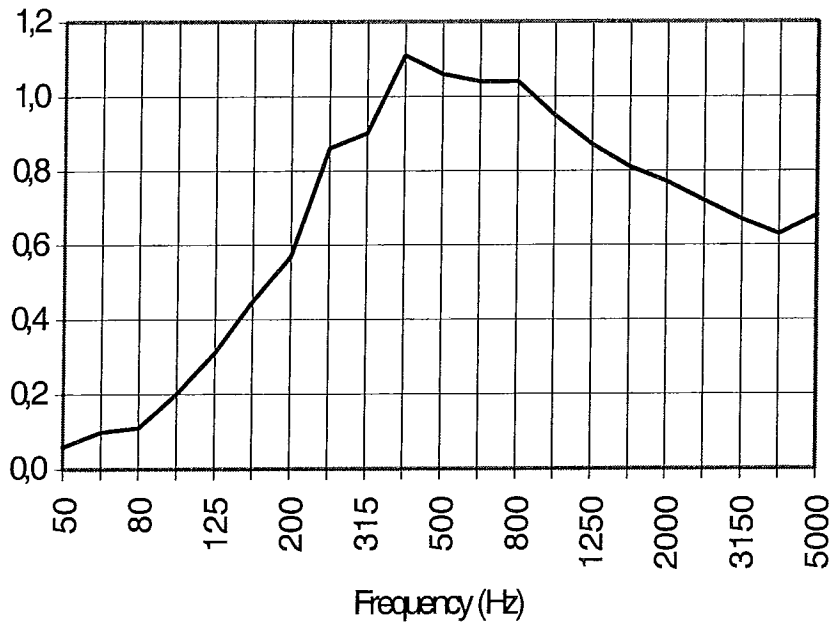
Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel PD8 with acoustic felt, mineral wool and 30 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 28, 1999
Conditions	Mounting depth: 82,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 86/ 86 %.
Result	Sound absorption class B according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,8 according to EN ISO 11654.

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,06
63	0,10
80	0,11
100	0,20
125	0,31
160	0,45
200	0,57
250	0,86
315	0,90
400	1,11
500	1,06
630	1,04
800	1,04
1000	0,95
1250	0,87
1600	0,81
2000	0,77
2500	0,72
3150	0,67
4000	0,63
5000	0,68

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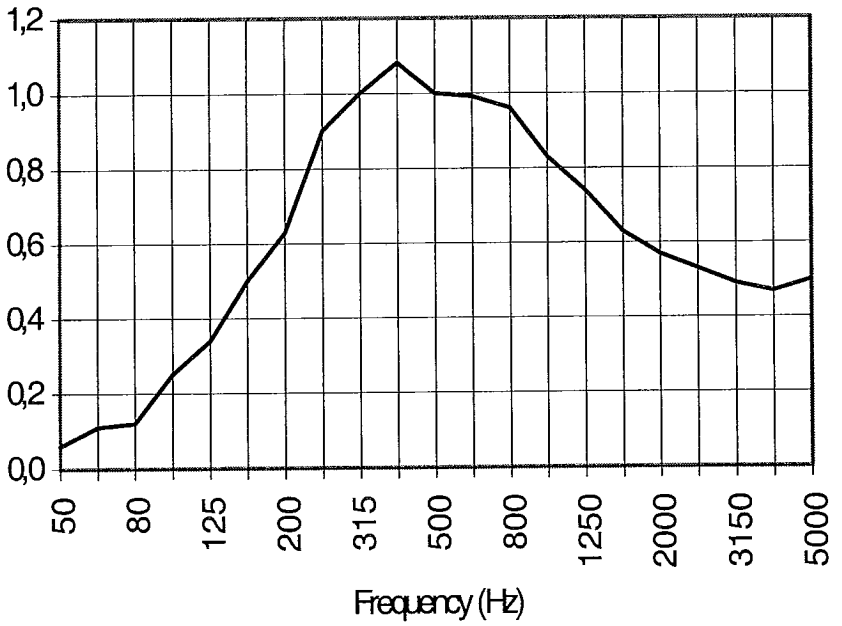
Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel SG8 with acoustic felt, mineral wool and 30 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 28, 1999
Conditions	Mounting depth: 82,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 85/ 86 %.
Result	Sound absorption class C according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,65(LM) according to EN ISO 11654.

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,06
63	0,11
80	0,12
100	0,25
125	0,34
160	0,50
200	0,63
250	0,90
315	1,00
400	1,08
500	1,00
630	0,99
800	0,96
1000	0,83
1250	0,74
1600	0,63
2000	0,57
2500	0,53
3150	0,49
4000	0,47
5000	0,50

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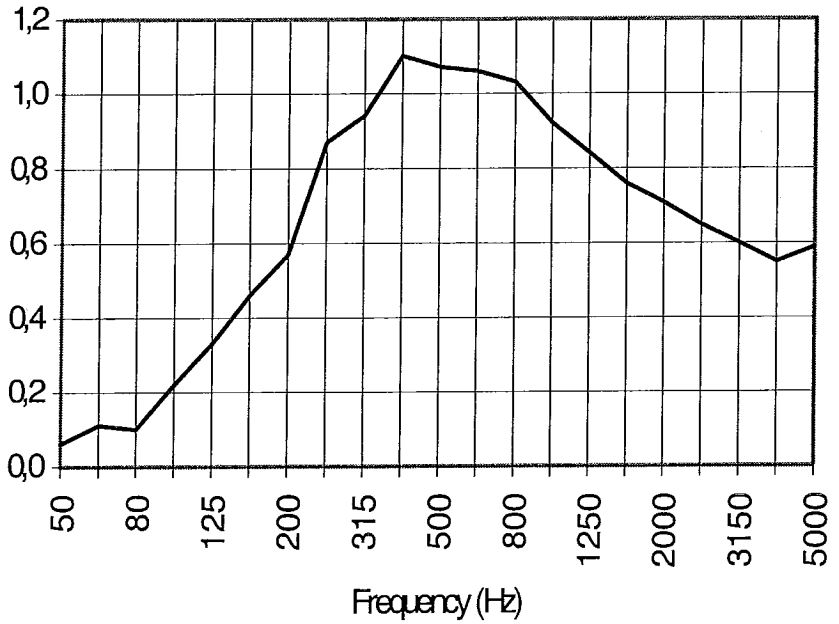
Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel SH8 with acoustic felt, mineral wool and 30 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 28, 1999
Conditions	Mounting depth: 82,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 86/ 86 %.
Result	Sound absorption class C according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,75(LM) according to EN ISO 11654.

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,06
63	0,11
80	0,10
100	0,22
125	0,33
160	0,46
200	0,57
250	0,87
315	0,94
400	1,10
500	1,07
630	1,06
800	1,03
1000	0,92
1250	0,84
1600	0,76
2000	0,71
2500	0,65
3150	0,60
4000	0,55
5000	0,59

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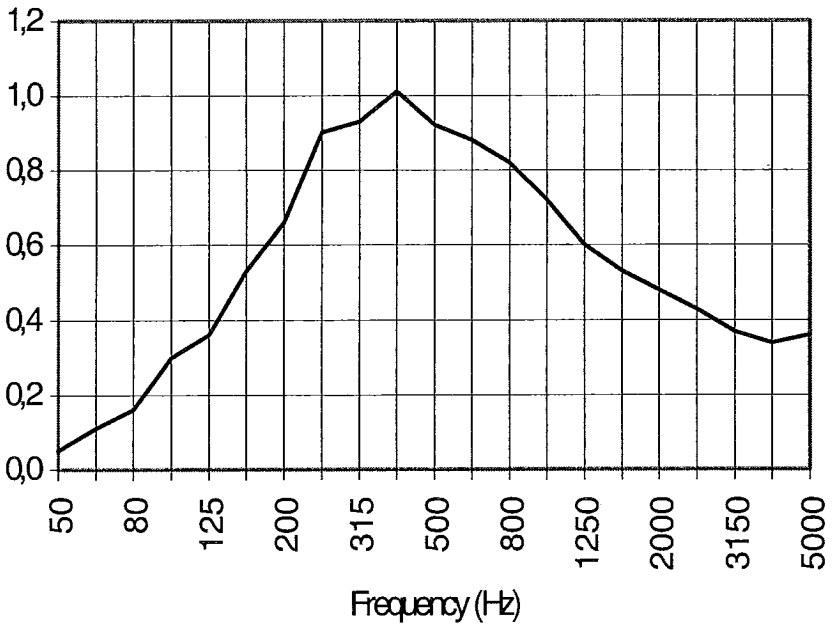
Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel SG5 with acoustic felt, mineral wool and 30 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 28, 1999
Conditions	Mounting depth: 82,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 87/ 86 %.
Result	Sound absorption class D according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,5(LM) according to EN ISO 11654.

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,05
63	0,11
80	0,16
100	0,30
125	0,36
160	0,53
200	0,66
250	0,90
315	0,93
400	1,01
500	0,92
630	0,88
800	0,82
1000	0,72
1250	0,60
1600	0,53
2000	0,48
2500	0,43
3150	0,37
4000	0,34
5000	0,36

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Technical Manager

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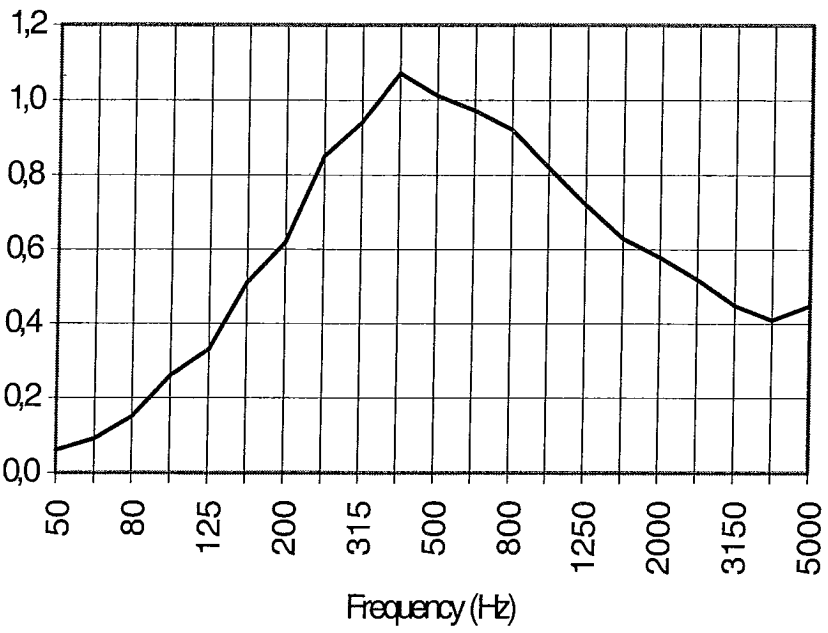
Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel SH5 with acoustic felt, mineral wool and 30 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 28, 1999
Conditions	Mounting depth: 82,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 86/ 86 %.
Result	Sound absorption class C according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,6(LM) according to EN ISO 11654.

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,06
63	0,09
80	0,15
100	0,26
125	0,33
160	0,51
200	0,62
250	0,85
315	0,94
400	1,07
500	1,01
630	0,97
800	0,92
1000	0,82
1250	0,72
1600	0,63
2000	0,58
2500	0,52
3150	0,45
4000	0,41
5000	0,45

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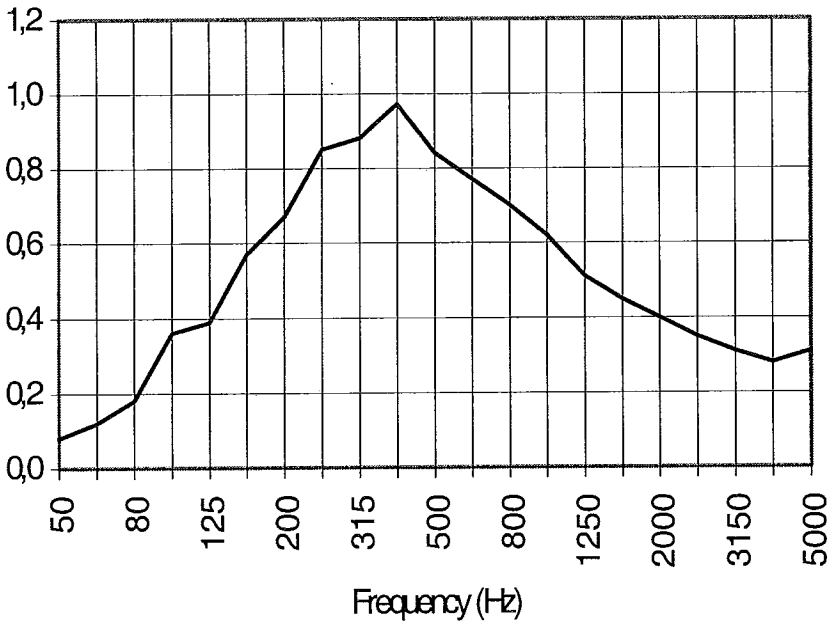
Joachim Stadig
Technical Officer

SP 511

Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel PG8 with acoustic felt, mineral wool and 30 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 28, 1999
Conditions	Mounting depth: 82,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 87/ 86 %.
Result	Sound absorption class D according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,45(LM) according to EN ISO 11654.

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,08
63	0,12
80	0,18
100	0,36
125	0,39
160	0,57
200	0,67
250	0,85
315	0,88
400	0,97
500	0,84
630	0,77
800	0,70
1000	0,62
1250	0,51
1600	0,45
2000	0,40
2500	0,35
3150	0,31
4000	0,28
5000	0,31

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Technical Officer

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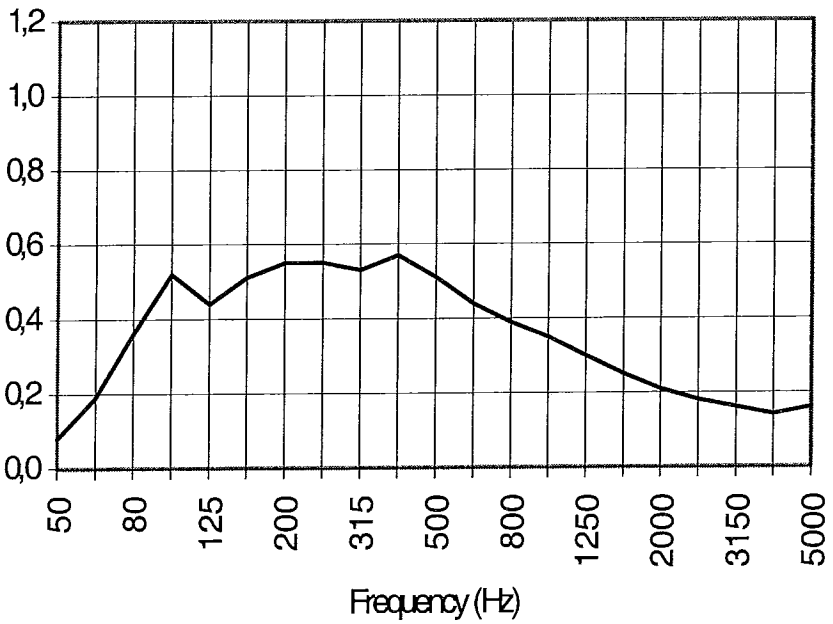
January 12, 2000 99F34779-E Enclosure 21

Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel PG5 with acoustic felt, mineral wool and 30 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 28, 1999
Conditions	Mounting depth: 82,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 87/ 86 %.
Result	Sound absorption class E according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,25(LM) according to EN ISO 11654.

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,08
63	0,19
80	0,36
100	0,52
125	0,44
160	0,51
200	0,55
250	0,55
315	0,53
400	0,57
500	0,51
630	0,44
800	0,39
1000	0,35
1250	0,30
1600	0,25
2000	0,21
2500	0,18
3150	0,16
4000	0,14
5000	0,16

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Hans Jonasson
Technical Manager

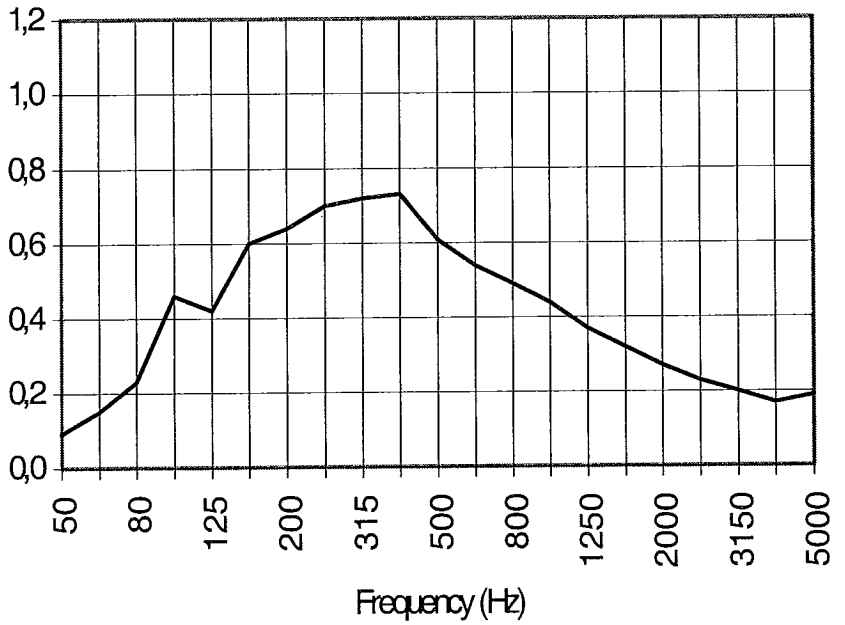
Joachim Stadig
Technical Officer

SP 511

Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel PH5 with acoustic felt, mineral wool and 30 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 29, 1999
Conditions	Mounting depth: 82,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 88/ 86 %.
Result	Sound absorption class D according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,3(LM) according to EN ISO 11654.

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,09
63	0,15
80	0,23
100	0,46
125	0,42
160	0,60
200	0,64
250	0,70
315	0,72
400	0,73
500	0,61
630	0,54
800	0,49
1000	0,44
1250	0,37
1600	0,32
2000	0,27
2500	0,23
3150	0,20
4000	0,17
5000	0,19

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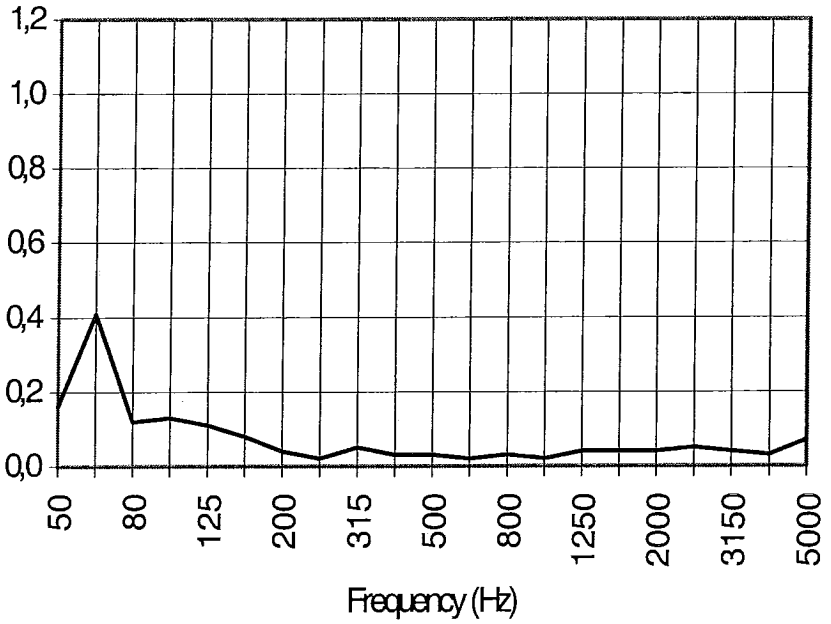
SP 511

Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel Non-perforated with mineral wool and 30 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 29, 1999
Conditions	Mounting depth: 82,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 85/ 86 %.
Result	Sound absorption class No class according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,05 according to EN ISO 11654.

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,16
63	0,41
80	0,12
100	0,13
125	0,11
160	0,08
200	0,04
250	0,02
315	0,05
400	0,03
500	0,03
630	0,02
800	0,03
1000	0,02
1250	0,04
1600	0,04
2000	0,04
2500	0,05
3150	0,04
4000	0,03
5000	0,07

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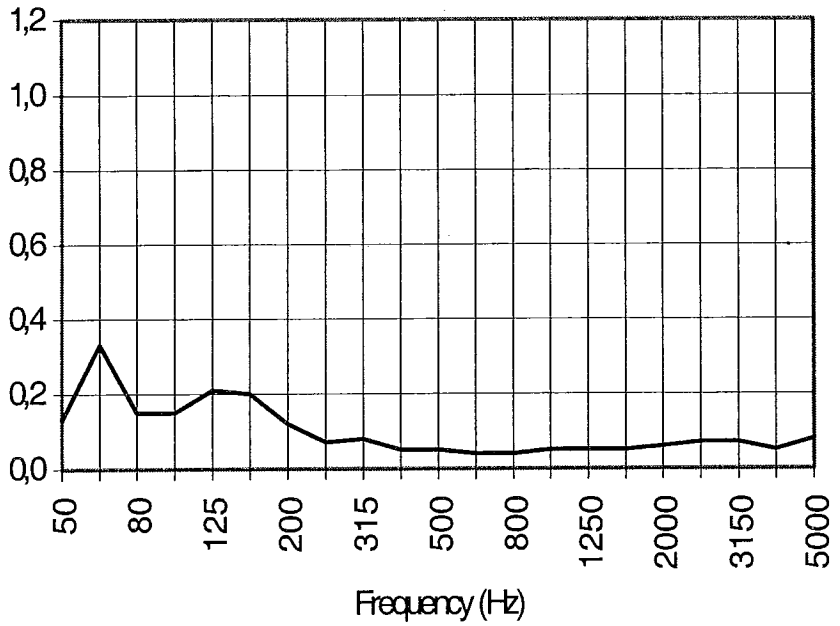
SP 511

Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel Non-perforated with mineral wool and 200 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 29, 1999
Conditions	Mounting depth: 252,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 85/ 86 %.
Result	Sound absorption class No class according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,05(L) according to EN ISO 11654.

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,13
63	0,33
80	0,15
100	0,15
125	0,21
160	0,20
200	0,12
250	0,07
315	0,08
400	0,05
500	0,05
630	0,04
800	0,04
1000	0,05
1250	0,05
1600	0,05
2000	0,06
2500	0,07
3150	0,07
4000	0,05
5000	0,08

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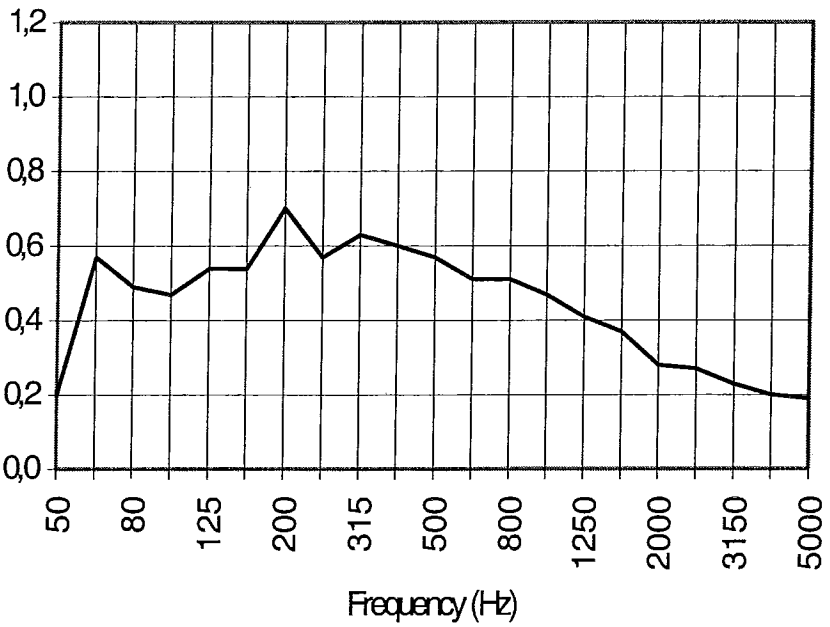
Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel PH5 with acoustic felt, mineral wool and 200 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 29, 1999
Conditions	Mounting depth: 252,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 86/ 86 %.
Result	Sound absorption class D according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,35(L) according to EN ISO 11654.

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,20
63	0,57
80	0,49
100	0,47
125	0,54
160	0,54
200	0,70
250	0,57
315	0,63
400	0,60
500	0,57
630	0,51
800	0,51
1000	0,47
1250	0,41
1600	0,37
2000	0,28
2500	0,27
3150	0,23
4000	0,20
5000	0,19

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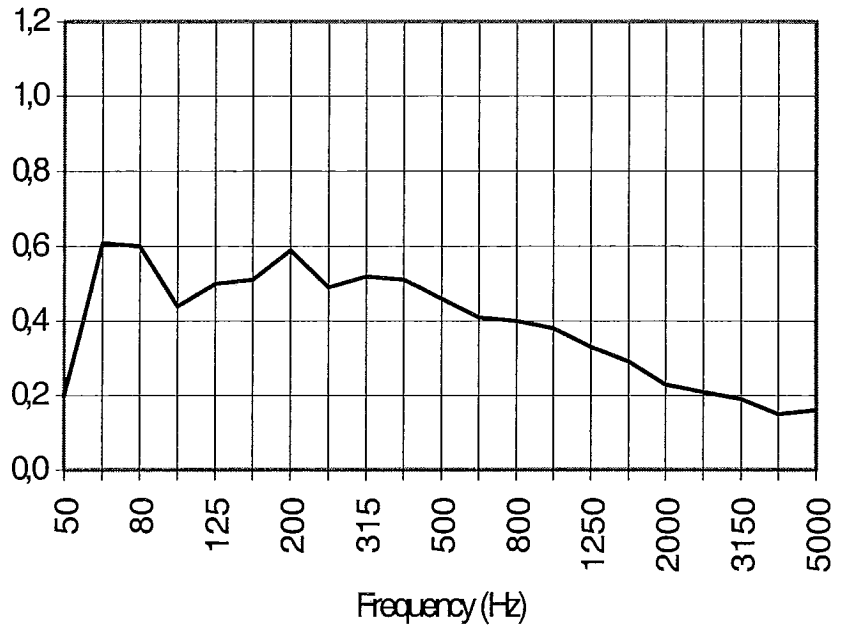
SP 511

Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel PG5 with acoustic felt, mineral wool and 200 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 29, 1999
Conditions	Mounting depth: 252,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 86/ 86 %.
Result	Sound absorption class D according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,3(L) according to EN ISO 11654.

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,20
63	0,61
80	0,60
100	0,44
125	0,50
160	0,51
200	0,59
250	0,49
315	0,52
400	0,51
500	0,46
630	0,41
800	0,40
1000	0,38
1250	0,33
1600	0,29
2000	0,23
2500	0,21
3150	0,19
4000	0,15
5000	0,16

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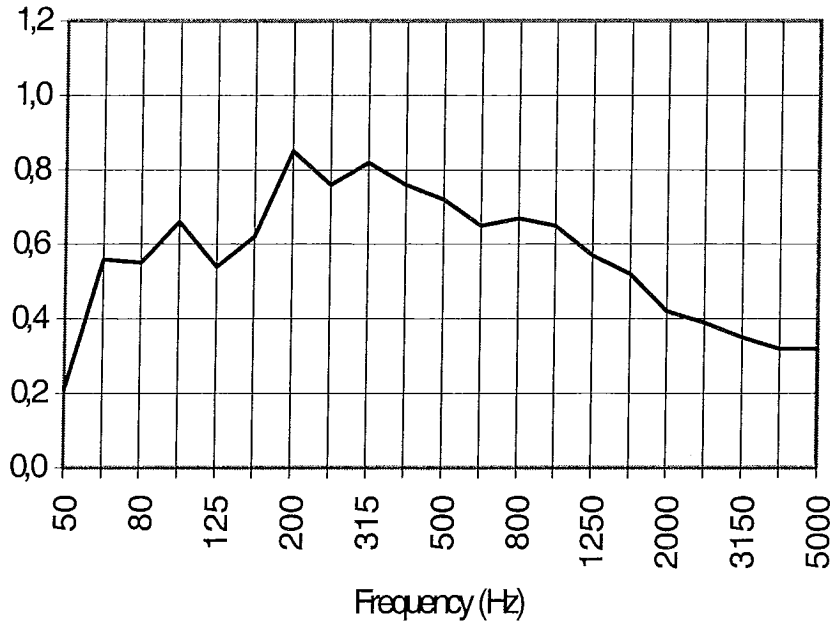
SP 511

Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel PG8 with acoustic felt, mineral wool and 200 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 29, 1999
Conditions	Mounting depth: 252,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 86/ 84 %.
Result	Sound absorption class D according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,5(L) according to EN ISO 11654.

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,21
63	0,56
80	0,55
100	0,66
125	0,54
160	0,62
200	0,85
250	0,76
315	0,82
400	0,76
500	0,72
630	0,65
800	0,67
1000	0,65
1250	0,57
1600	0,52
2000	0,42
2500	0,39
3150	0,35
4000	0,32
5000	0,32

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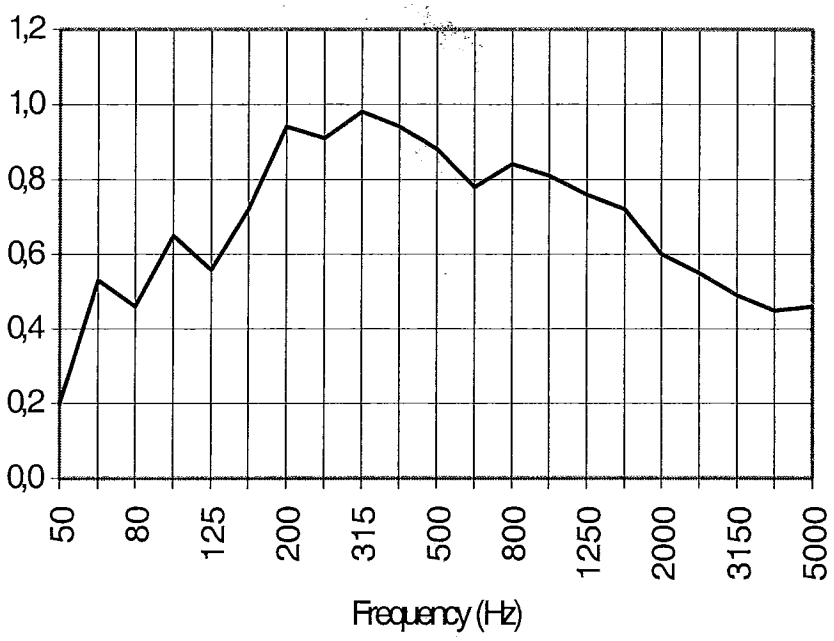
Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel SH5 with acoustic felt, mineral wool and 200 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 29, 1999
Conditions	Mounting depth: 252,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 20 °C. Relative humidity at measurement on object/in empty room: 87/ 70 %.
Result	Sound absorption class C according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,6(LM) according to EN ISO 11654.

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,20
63	0,53
80	0,46
100	0,65
125	0,56
160	0,72
200	0,94
250	0,91
315	0,98
400	0,94
500	0,88
630	0,78
800	0,84
1000	0,81
1250	0,76
1600	0,72
2000	0,60
2500	0,55
3150	0,49
4000	0,45
5000	0,46

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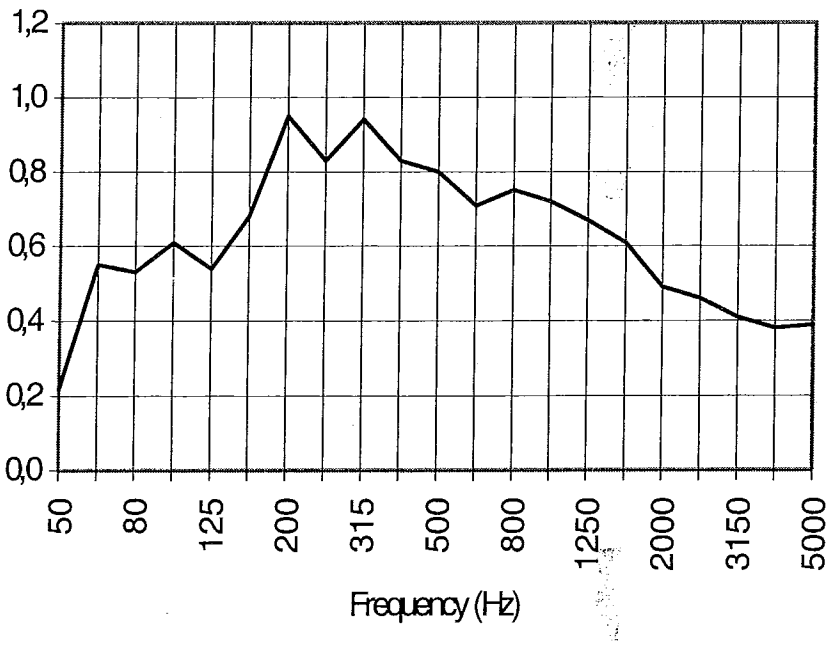
Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel SG5 with acoustic felt, mineral wool and 200 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 30, 1999
Conditions	Mounting depth: 252,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 87/ 86 %.
Result	Sound absorption class D according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,55(LM) according to EN ISO 11654.

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,22
63	0,55
80	0,53
100	0,61
125	0,54
160	0,68
200	0,95
250	0,83
315	0,94
400	0,83
500	0,80
630	0,71
800	0,75
1000	0,72
1250	0,67
1600	0,61
2000	0,49
2500	0,46
3150	0,41
4000	0,38
5000	0,39

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SP 511

Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel SH8 with acoustic felt, mineral wool and 200 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 30, 1999
Conditions	Mounting depth: 252,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 87/ 86 %.
Result	Sound absorption class C according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,75(L) according to EN ISO 11654.

Sound absorption coefficient

Frequency (Hz)	α_s
50	0,17
63	0,32
80	0,38
100	0,73
125	0,51
160	0,75
200	0,97
250	1,04
315	1,05
400	1,02
500	0,99
630	0,84
800	0,89
1000	0,91
1250	0,90
1600	0,86
2000	0,73
2500	0,70
3150	0,63
4000	0,61
5000	0,60

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SP 511

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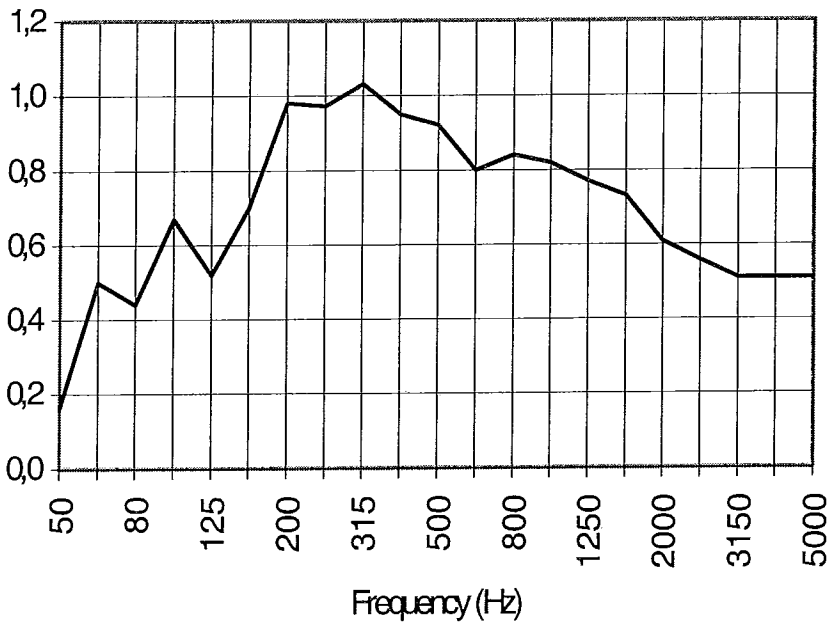
Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel SG8 with acoustic felt, mineral wool and 200 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 30, 1999
Conditions	Mounting depth: 252,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 87/ 86 %.
Result	Sound absorption class C according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,65(LM) according to EN ISO 11654.

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,16
63	0,50
80	0,44
100	0,67
125	0,52
160	0,70
200	0,98
250	0,97
315	1,03
400	0,95
500	0,92
630	0,80
800	0,84
1000	0,82
1250	0,77
1600	0,73
2000	0,61
2500	0,56
3150	0,51
4000	0,51
5000	0,51

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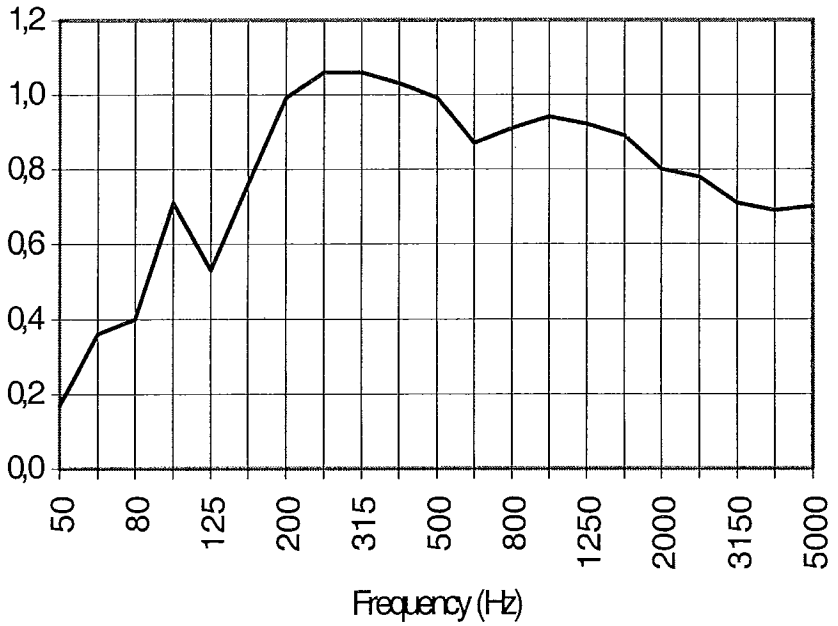
SP 511

Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel PD8 with acoustic felt, mineral wool and 200 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 30, 1999
Conditions	Mounting depth: 252,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 87/ 86 %.
Result	Sound absorption class B according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,85(L) according to EN ISO 11654.

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,17
63	0,36
80	0,40
100	0,71
125	0,53
160	0,76
200	0,99
250	1,06
315	1,06
400	1,03
500	0,99
630	0,87
800	0,91
1000	0,94
1250	0,92
1600	0,89
2000	0,80
2500	0,78
3150	0,71
4000	0,69
5000	0,70

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Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel PH10 with acoustic felt, mineral wool and 200 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 30, 1999
Conditions	Mounting depth: 252,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 87/ 86 %.
Result	Sound absorption class C according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,75(L) according to EN ISO 11654.

Sound absorption coefficient

Frequency (Hz)	α_s
50	0,17
63	0,43
80	0,42
100	0,68
125	0,51
160	0,73
200	0,98
250	0,96
315	1,01
400	0,97
500	0,94
630	0,83
800	0,86
1000	0,87
1250	0,88
1600	0,84
2000	0,73
2500	0,67
3150	0,60
4000	0,56
5000	0,60

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Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel PH8 with acoustic felt, mineral wool and 200 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 30, 1999
Conditions	Mounting depth: 252,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 87/ 86 %.
Result	Sound absorption class D according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,55(LM) according to EN ISO 11654.

Sound absorption coefficient

Frequency (Hz)	α_s
50	0,24
63	0,47
80	0,41
100	0,67
125	0,55
160	0,68
200	0,93
250	0,94
315	0,97
400	0,91
500	0,87
630	0,76
800	0,81
1000	0,79
1250	0,73
1600	0,67
2000	0,55
2500	0,50
3150	0,44
4000	0,39
5000	0,40

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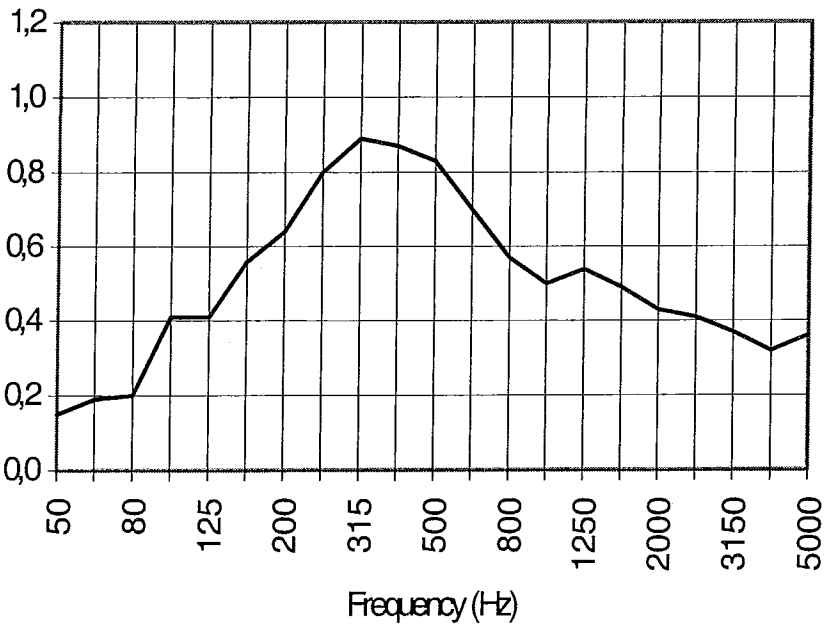
Measurement of sound absorption coefficient

Test	Measurement of sound absorption coefficient in a reverberation room according to SS-EN 20354 (ISO 354).
Client	Gustafs Inredningar i Dalarna AB Peter Markoff
Object	Gustafs BF-Panel PH8 with acoustic felt and 200 mm air gap Thickness: 12,5 mm. Panel size: 600 mm x 1200 mm.
Date of test	December 30, 1999
Conditions	Mounting depth: 212,5 mm. Surface area: 10,8 m^2. Room volume: 200 m^3. Temperature at measurement on object/in empty room: 18/ 18 °C. Relative humidity at measurement on object/in empty room: 87/ 86 %.
Result	Sound absorption class D according to EN ISO 11654. Weighted sound absorption coefficient α_w = 0,5(LM) according to EN ISO 11654.

Sound absorption coefficient



Frequency (Hz)	α_s
50	0,15
63	0,19
80	0,20
100	0,41
125	0,41
160	0,56
200	0,64
250	0,80
315	0,89
400	0,87
500	0,83
630	0,70
800	0,57
1000	0,50
1250	0,54
1600	0,49
2000	0,43
2500	0,41
3150	0,37
4000	0,32
5000	0,36

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