Sound absorption coefficient measurement of Gabriel Runner and Event Screen materials

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Client: Gabriel A/S
Hjulmagervej 55
DK-9100 Aalborg
Danmark

Attn.: Bente Ellingsøe Attemann

Prepared by: **Fabrice Ducret**

Reviewed by: **Christopher Maxon**

Tel +45 3531 1000
Fax +45 3531 1001
Email ods@lr-ods.com
Web www.lr-ods.com

Visit Titangade 15
City 2200 Copenhagen N
Country Denmark

CONTENTS

1 INTRODUCTION

At the request of Gabriel A/S, Lloyd's Register ODS (LR-ODS) performed on 24th June 2010 a sound absorption coefficient measurement in the reverberation room 005 of the building 355 at the technical university of Denmark (DTU). Two materials were tested: Runner and Event screen. The measurement was performed according to the ISO standard ISO-354:2003 "Acoustics-Measurement of sound absorption in a reverberation room".

2 EXPERIMENTAL DESCRIPTION

The material was mounted on a wooden frame with a height of 55 mm (type E-55). 2 plane absorbers for each type of material were constructed and laid on the floor of the DTU reverberation room as shown in Figure 1. The frame was sealed to the floor and to the material with duct tape. The plane absorbers were placed in the middle of the room on the floor

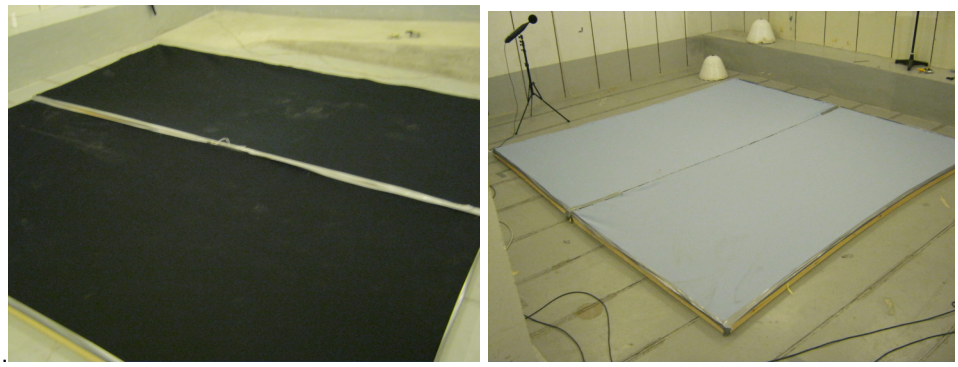


Figure 1: Plane absorbers (Runner-left, Event Screen-right) in the DTU reverberation room

The measurement and data recording were carried out with a Brüel & Kjær 2260 Investigator number 2001781/2020998 calibrated by the Danish accreditation and metrology fund Danak on 23-03-2009 certification number C0902642. The sound level meter was first calibrated with a Brüel & Kjær 4231 sound pressure calibrator.
The source of excitation was provided with a Brüel & Kjær 4224 loudspeaker driven by the 2260 investigator. The interrupted noise method and pink noise excitation signal were employed

A total of 6 measurement positions for each configuration (3 microphone positions * 2 loudspeaker positions) were recorded. 4 decays were averaged at each position.
3 configurations were tested. Empty room, Runner material plane absorbers and Event Screen plane absorbers. For each configuration a spatially averaged reverberation time in third-octave band was obtained.
The absorption coefficient for the two materials were further derived from these sets of measurement data.

3 RESULTS

The results presented in graphic and tabular forms are shown in Figure 2 for the Event Screen material and in Figure 3 for the Runner material.

measure date:	22-06-2010	measure place:	Reverberation room DTU
conducted by:	FDU		

client	
name:	Gabriel
adresse:	Hjulmagervej 55 DK-9100 Aalborg DK
contact:	Bente Ellingsøe Attermann

reverberation room		
length	L (m)	7.85
width	B (m)	6.25
height	H (m)	4.95
volume	V (m^3)	242.86
surface area	S_t (m^2)	237.72

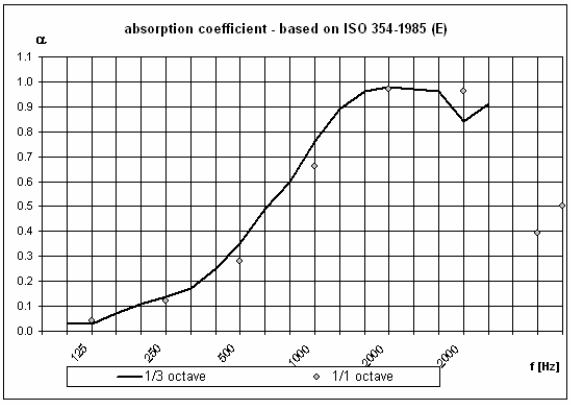
comments
B&K 2260 INVESTIGATOR
B&K 4224 loudspeaker

test samples	
description:	Fabric type: Event screen with P-mix 100% PE faceside 2 plane absorbers laid on floor 55 mm airspace to the floor
mounting:	55mm height wooden frame sealed

test sample + measurement condition		
area of sample	S (m^2)	10.90
temperature	t (°C)	22.0
humidity	RF (%)	50.0
speed of sound	c (m/s)	344.2

measurement	
nr. of microphones	3
nr. of source positions	2
excitation signal	interrupted

measurement results			1/3 octave		1/1 octave	
frequency	T_1	T_2	A	α	A	α
Hz	s	s	m^2		m^2	
100	7.81	7.30	0.35	**0.03**		
125	7.79	7.27	0.36	**0.03**	0.41	**0.04**
160	7.54	6.63	0.71	**0.07**		
200	8.33	6.62	1.21	**0.11**		
250	7.56	5.82	1.54	**0.14**	1.34	**0.12**
315	7.48	5.53	1.84	**0.17**		
400	7.14	4.79	2.68	**0.25**		
500	6.46	3.96	3.81	**0.35**	3.08	**0.28**
630	6.21	3.37	5.30	**0.49**		
800	5.88	2.96	6.55	**0.60**		
1000	5.45	2.52	8.32	**0.76**	7.17	**0.66**
1250	5.11	2.25	9.71	**0.89**		
1600	4.64	2.07	10.44	**0.96**		
2000	4.24	1.96	10.70	**0.98**	10.57	**0.97**
2500	3.81	1.87	10.62	**0.97**		
3150	3.10	1.69	10.50	**0.96**		
4000	2.53	1.59	9.12	**0.84**	10.47	**0.96**
5000	2.22	1.42	9.90	**0.91**		



Weighted Absorption Coefficient α	0.40	Absorption Class	D
Noise Reduction Coefficient	0.50		

Figure 2: Event Screen absorption coefficient results

measure date:	24-06-2010	measure place:	Reverberation room DTU
conducted by:	FDU		

client	
name:	Gabriel
adresse:	Hjulmagervej 55 DK-9100 Aalborg DK
contact:	Bente Ellingsøe Attermann

reverberation room		
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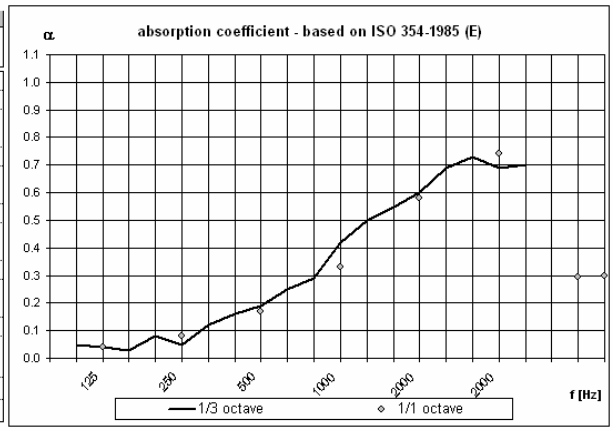
comments
B&K 2260 INVESTIGATOR
B&K 4224 loudspeaker

test samples	
description:	Fabric type: Runner with P-mix 100% PE faceside 2 plane absorbers laid on floor 55 mm airspace to the floor
mounting:	55mm height wooden frame sealed

test sample + measurement condition		
area of sample	S (m^2)	10.90
temperature	t (°C)	22.0
humidity	RF (%)	50.0
speed of sound	c (m/s)	344.2

measurement	
nr. of microphones	3
nr. of source positions	2
excitation signal	interrupted

measurement results			1/3 octave		1/1 octave	
frequency	T_1	T_2	A	α	A	α
Hz	s	s	m^2		m^2	
100	7.81	7.02	0.56	**0.05**		
125	7.79	7.23	0.39	**0.04**	0.41	**0.04**
160	7.54	7.13	0.30	**0.03**		
200	8.33	7.09	0.82	**0.08**		
250	7.56	6.85	0.53	**0.05**	0.85	**0.08**
315	7.48	5.97	1.32	**0.12**		
400	7.14	5.45	1.69	**0.16**		
500	6.46	4.83	2.04	**0.19**	1.87	**0.17**
630	6.21	4.35	2.69	**0.25**		
800	5.88	3.97	3.19	**0.29**		
1000	5.45	3.31	4.63	**0.42**	3.63	**0.33**
1250	5.11	2.98	5.46	**0.50**		
1600	4.64	2.71	5.99	**0.55**		
2000	4.24	2.47	6.59	**0.60**	6.30	**0.58**
2500	3.81	2.20	7.49	**0.69**		
3150	3.10	1.90	7.95	**0.73**		
4000	2.53	1.70	7.53	**0.69**	8.05	**0.74**
5000	2.22	1.55	7.60	**0.70**		



Weighted Absorption Coefficient α	0.30	Absorption Class	D
Noise Reduction Coefficient	0.30		

Figure 3: Runner absorption coefficient results

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4 CONCLUSIONS

At the request of Gabriel A/S, Lloyd's Register ODS (LR-ODS) performed on 24th June 2010 a sound absorption coefficient measurement in the reverberation room 005 of the building 355 at the technical university of Denmark (DTU). Two materials were tested: Runner and Event screen. The measurement was performed according to the ISO standard ISO-354:2003 "Acoustics-Measurement of sound absorption in a reverberation room". The absorption class for the materials is of type D. The weighted sound absorption coefficient α_w is 0.4 for the Event Screen material and 0.3 for the Runner material.

As it can be seen on Figure 4, the Event Screen material performs better at high frequencies than the Runner in terms of sound absorption.

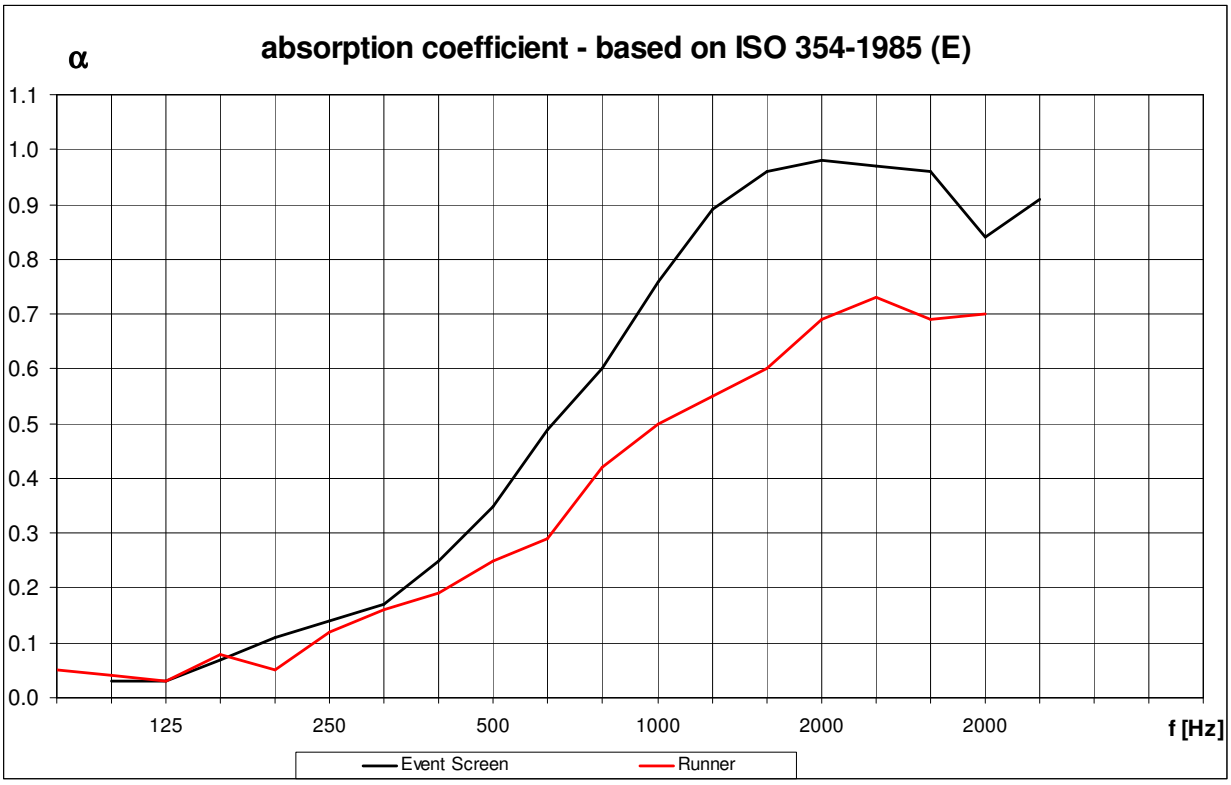

Figure 4: Comparison between Runner and Event Screen absorption coefficient results

REFERENCES

1/ "Acoustics-*measurement of sound absorption in a reverberation room*" - ISO 354:2003 European standard.