

SOUND ABSORPTION TEST REPORT

EN ISO 354: 2003

For

Wooden Acoustic Panel Model Name: 2440*128*15mm Brand Name: REMAK

Report No.: ENC110509GZ74E1

Date of Issue: May 12, 2011

Prepared For

Detech Real Estate and Trading Joint stock Company Head office: P301 Detech Building, 15B Pham Hung, Tu Liem, Hanoi, Vietnam Branch office: P706 B2 Block, Ham Nghi street, My Dinh 1, Tu Liem, Hanoi, Vietnam

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GENERAL INFORMATION:

Product Description:	Wooden Acoustic Panel
Model Number:	2440*128*15mm
Model Difference:	All models use the same materials
Brand Name:	REMAK
Applicant:	Detech Real Estate and Trading Joint Stock Company
	Head Office: P301 Detech Building, 15B Pham Hung, Tu Liem, HN, VN Branch Office: P706 B2 Block, Ham Nghi, My Dinh 1, Tu Liem, HN, VN
Manufacturer:	Remak Co.,Ltd
	Room A68, Building 04, Area A, Junjing Garden, Shishan Town, Nanhai District, Foshan City, Guangdong Province
Report No.:	ENC110509GZ74E1
Test Methods:	EN ISO 354: 2003 Acoustics - Measurement of sound absorption in a reverberation room. The absorption class was determined in conformance with EN ISO 11654:1997
Test Results:	See next sheet
Sample Receiving Date:	May 9, 2011
Test Performing Date:	May 9, 2011 – May12, 2011

Summary of test results:

sou	ind absorption coeffi	cient -	Wooden	Acousti	c Panel	(2440*1	28*15mr	n)	0 0
0	ctave centre frequency f / Hz	125	250	500	1000	2000	4000	α _w	Sound absorption class
	Stick metope	0.05	0.10	0.35	0.50	0.35	0.45	0.35	D
spo	3 cm spaces	0.10	0.25	0.50	0.60	0.60	0.65	0.50	С
ethc	27.5 cm spaces	0.05	0.25	0.50	0.70	0.60	0.70	0.55	C S
llation Me	3 cm Thickness/Fill 3 cm thickness 50kg/m ³ soft materials	0.60	0.80	0.70	0.80	0.75	0.60	0.75	В
Insta	27.5 cm spaces/ Fill 4 cm thickness 50kg/m ³ soft materials	0.70	0.75	0.85	0.75	0.85	0.90	0.80	A BODT

Checked By

Yemig

Yemig May12, 2011

Authorized By



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Annex1: Test result 1

Specimen:

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Wooden Acoustic Panel (2440*128*15mm) Stick metope

Installation Methods:Stick metopeClient:Detech Real Estate and Trading Joint stock CompanyLaboratory:East Notice Certification Service Co., Ltd.

Specimen area:	0.085 m ²	Test room volume:	155 m ³
Surface mass:	9.0 kg/m ²	Area of room boundaries:	179 m ²
Temperature of test room:	22 °C	Test date:	2011-05-10
Relative humidity:	61 %	Test file identification:	ENC110509GZ74E1-1
Atmospheric pressure:	102 KPa		

Third octave band results:

Frequency [Hz]	αS 1/3 octave	αp oktave	40		-	₩ - 8	Sound	abs	orptic	n co	effici	ent			
100	0.02	4		1.2											
125	0.02	0.05 🧷													
160	0.04			σ ₀									_		
200	0.04	14 ×	0.4	56	ent -										
250	0.09	0.10 🧄	2	Iffici											
315	0.14		.0	8.0 8	0.8										
400	0.22	1.5	u o												
500	0.35	0.35	56	btic											
630	0.44		2												
800	0.52	0		d ab											
1000	0.54	0.50		5 0.4								<u> </u>	┍╱┻┙		
1250	0.51		50	S											
1600	0.35	D	2												
2000	0.31	0.35		0.2						-					
2500	0.39														
3150	0.42	04	26	0											
4000	0.43	0.45	2		100	160	250	400	630	100	0 160	0 25)0 4	000	
5000	0.47									,	Freq	Jenc	/f/	Hz	

 α s Sound absorption coefficient according to ISO 354

 $^{\alpha}$ $_{p}$ Practical sound absorption coefficient according to ISO 11654

Weighted sound absorption coefficient α_w = 0.35, Sound absorption class: D

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Test result 2	
Specimen:	Wooden Acoustic Panel (2440*128*15mm)
Installation Methods:	3 cm spaces
Client:	Detech Real Estate and Trading Joint stock Company
Laboratory:	East Notice Certification Service Co., Ltd.

Specimen area:	0.085 m ²	Test room volume:	155 m ³
Surface mass:	9.0 kg/m ²	Area of room boundaries:	179 m ²
Temperature of test room:	22 °C	Test date:	2011-05-10
Relative humidity:	61 % 0	Test file identification:	ENC110509GZ74E1-2
Atmospheric pressure:	102 KPa		

Third octave band results:

Frequency	αS	αρ	1	- And -				- 1	1 cm			Contra A		
[Hz]	1/3 octave	oktave	é.		_	- Se	ound	absc	rptio	n coe	effici	ent		
100	0.06	4		1.20										
125	0.09	0.10 🧷												
160	0.10			^σ ₁₀₀										
200	0.14	V ~	5	ent									\vdash	
250	0.22	0.25 🧄	1	ffici										
315	0.33		0	0.80										
400	0.39	1.5		o uc								_	$\left \right $	
500	0.52	0.50	56	o o di										
630	0.57		2						J₽		┝┉╌╻	▞┺		
800	0.61	0		dat					┍					
1000	0.60	0.60		J 0.40										
1250	0.57		56	S										
1600	0.55	D	4	0.00										
2000	0.59	0.60		0.20										
2500	0.57					∎┤■								
3150	0.60	04	26	0.00										
4000	0.63	0.65	4		100	160	250	400	630	100	0 16	00 2	500 4	4000
5000	0.67			1.1							-req	uen	cy f i	/ Hz

 α s Sound absorption coefficient according to ISO 354

 α $_{\rm p}$ Practical sound absorption coefficient according to ISO 11654

Weighted sound absorption coefficient α_w = 0.50, Sound absorption class: C

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Test result 3			
Specimen:	Wooden Acoustic Panel (2440*128*15)	nm)	
Installation Methods:	27.5 cm spaces		
Client:	Detech Real Estate and Trading Joint	stock Company	
Laboratory:	East Notice Certification Service Co., L	td.	

Specimen area:	0.085 m ²	Test room volume:	155 m ³
Surface mass:	9.0 kg/m ²	Area of room boundaries:	179 m ²
Temperature of test room:	22 °C	Test date:	2011-05-10
Relative humidity:	61 % 0	Test file identification:	ENC110509GZ74E1-3
Atmospheric pressure:	102 KPa		

Third octave band results:

Frequency	αS	ap		- Alexandra		Real			10th				C			
[Hz]	1/3 octave	oktave	56		-	⊢ S	ound	abso	orpti	on	coe	ffici	ent			
100	0.04	44	Č.	1.20												
125	0.04	0.05 🧷											+		+	-
160	0.06	A. A.F		σ ₁₀₀								\pm	+		\pm	_
200	0.18	V 4	56	ent					_			—	+	+	+	-
250	0.26	0.25 🧄	6	ffici									+		+	
315	0.26	0		8 0.80									+		+	
400	0.37	1.5	ant I	on o						_	F		ᡧ		_	Ŧ
500	0.51	0.50	56	btic 0.60							\mid		\mathcal{F}		7	
630	0.62	A)	2	0.00 S					\bot	M					+	
800	0.57	0	1	d at					┦┼				—		+	
1000	0.73	0.70		j 0.40				+					+		+	_
1250	0.79	04	56	S				\mathcal{F}				_	+		\mp	
1600	0.73	40	1	0.20								_	-		+	
2000	0.59	0.60 💍		0.20								_	+		Ŧ	
2500	0.55	A T										_	-		\mp	-
3150	0.66	9.4	56	0.00												
4000	0.68	0.70	2		100	160	250	400	63	0 1	000	160)0 2	2500	400	00
5000	0.77	6		6.7							F	requ	Jen	cy f	/ -	1Z

 α s Sound absorption coefficient according to ISO 354

 α_{p} Practical sound absorption coefficient according to ISO 11654

Weighted sound absorption coefficient α_w = 0.55, Sound absorption class: C

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Test result 4	
Specimen:	Wooden Acoustic Panel (2440*128*15mm)
Installation Methods:	3 cm Thickness/Fill 3 cm thickness 50kg/m ³ soft materials
Client:	Detech Real Estate and Trading Joint stock Company
Laboratory:	East Notice Certification Service Co., Ltd.

Specimen area:	0.085 m ²	Test room volume:	155 m ³
Surface mass:	9.0 kg/m ²	Area of room boundaries:	179 m ²
Temperature of test room:	22 °C	Test date:	2011-05-10
Relative humidity:	61 % 0	Test file identification:	ENC110509GZ74E1-4
Atmospheric pressure:	102 KPa		

Third octave band results:

Froquonav	25	an	1	- Carth		- Aller			and a		R	and the second		
[Hz]	1/3 octave	oktave	56			- So	ound	abso	rptior	n coe	fficie	nt		
100	0.48	A.	1	1.20										
125	0.63	0.60 🧷												
160	0.73			σ ₁₀₀										
200	0.78	V ~ Y	56	ent ent										
250	0.79	0.80	1	Ifici										
315	0.78			0.80			┱┤┻┥			<u></u> ∎-∎-				
400	0.70	2.5		on o		F)	_	
500	0.66	0.70	50											
630	0.72		×	0.00 S	\square									
800	0.80	0		d at										
1000	0.82	0.80		Š 0.40										
1250	0.83		50	So										
1600	0.81	AU	1	0.20										
2000	0.73	0.75		0.20										
2500	0.68													
3150	0.65	0.4	56	0.00										
4000	0.61	0.60	4		100	160	250	400	630	1000	1600) 250	0 4	000
5000	0.56			6.7					6	- F	requ	ency	'†/	Hz

 α _S Sound absorption coefficient according to ISO 354

 α $_{\rm p}$ Practical sound absorption coefficient according to ISO 11654

Weighted sound absorption coefficient α_w = 0.75, Sound absorption class: B

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Test result 5		
Specimen:	Wooden Acoustic Panel (2440*128*15mm)	
Installation Methods:	27.5 cm spaces/ Fill 4 cm thickness 50kg/m ³ soft materials	
Client:	Detech Real Estate and Trading Joint stock Company	
Laboratory:	East Notice Certification Service Co., Ltd.	

Specimen area:	0.085 m ²	Test room volume:	155 m ³
Surface mass:	9.0 kg/m ²	Area of room boundaries:	179 m ²
Temperature of test room:	22 °C	Test date:	2011-05-10
Relative humidity:	61 % 0	Test file identification:	ENC110509GZ74E1-5
Atmospheric pressure:	102 KPa		

Third octave band results:

Frequency	αS	αρ	(⊢ ¢⁄	hund	ahaa	rotio		fficio	nt			. 2
[Hz]	1/3 octave	oktave	h		- 30	Junu	au50	puor		mule	III			
100	0.61	4	1.20											
125	0.67	0.70 🖉												
160	0.74	C. A.F	σ ₁₀₀											
200	0.76	VY S	ent b					_				_		
250	0.75	0.75 🧄	ffici										┦┻┦	-
315	0.80	0	08.0				╸┲		<u> </u>				\square	
400	0.80	1.5	on e				_			-			\square	
500	0.85	0.85											\square	
630	0.84	D											\square	
800	0.75	0	d at										\square	
1000	0.75	0.75	ŭ 0.40										\square	
1250	0.76	04	S P										\square	
1600	0.80	D	0.00										\square	
2000	0.83	0.85	0.20									_	\square	
2500	0.85	the second second											\square	-
3150	0.89	0.4	0.00											
4000	0.91	0.90		100	160	250	400	630	1000) 1600) 25	00 4	1000)
5000	0.91	2							F	requ	enc	<u>y f /</u>	Hz	<u>′</u>

 α s Sound absorption coefficient according to ISO 354

 α $_{\rm p}$ Practical sound absorption coefficient according to ISO 11654

Weighted sound absorption coefficient α_w = 0.80, Sound absorption class: B

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Annex 2: Mounting of specimen

The specimen was mounted in the reverberation room in conformance with ISO 354:2003 Annex B.





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Annex 3: Measurement arrangements

1. Acoustical measurements

The test signal was produced to the test room using three fixed omnidirectional loudspeakers (6 x Seas B&K2260D). The test signal (pink noise) was produced by a real time analyzer (Bruel & Kjaer 2133) and amplified with terminal amplifier (B&K2716). The sound pressure level in the reverberation room was measured with a condencer microphone on a tripod (B&K 5821 equipped with a pre-amplifier B&K4296).

The reverberation time at third-octave bands was measured with the real time analyzer (B&K4189) using 20 dB decay range. All frequency bands were measured using 2 sources simultaneously and 4 microphone locations. In every location an ensemble average of 10 decays was measured. The total number of reverberation time measurements was 8.

The acoustical measurement equipment fullfilled the following IEC standards and grades of accuracy:

IEC 651	Sound level meters	type 1
IEC 804	Integrating sound level meters	type 1
IEC 1260	Octave-band and fractional-octave-band filters	class 1
IEC 942	Sound level calibrators	class '

2. Other measurements

The temperature and the relative humidity of the measurement rooms were measured with a psykrometer (Casella London 7165). The ambient atmospheric pressure was measured with a barometer (B&K MD0001). The specimen was weighed with a 150 kg precision weighing machine (PM 150). The dimensions of the specimen were measured with a roll meter (K-Prof).

3. The test room

The reverberation room was equipped with six fixed diffuser panels. The positions were selected randomly in respect with altitude, angle and position. The amount of diffusers and their arrangement fulfills the requirements of Annex A in ISO 354. The reverberation time of the reverberation room fulfills the requirements of ISO 354 for 155 m³ test room.

4. References to the ISO standards

Test: ISO 354:2003 (E) Acoustics - Measurement of sound absorption in a reverberation room, International Organization for Standardization, 2003, Genève, Switzerland.

SFS-EN ISO 11654 Acoustics - Sound absorbers for use in buildings - Rating of sound absorption, International Organization for Standardization, 1997, Genève, Switzerland

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