ACOUSTICS AND LIGHTING DEPARTMENT

Acoustics Test Laboratory

TEST REPORT N° AC10-26024612
CONCERNING SUSPENDED CEILING PANELS

The accreditation by the COFRAC Laboratory Section attests to the technical competence of the laboratories only for the tests covered by the accreditation.

This test report certifies only the characteristics of the object submitted for testing and does not prejudge the characteristics of similar products. So it does not constitute a product certification in the sense of Article L 115-27 of the Consumer Code and of the Law of June 3, 1994.

If this report is being issued through electronics and/or physical electronic media, only the paper version of the report signed by CSTB shall be deemed authentic in case of litigation. This report in paper form is kept at CSTB for a minimum period of 10 years.

The reproduction of this test report is only authorised in its integral form.

It comprises ten pages.

REQUESTED BY : **ROCKWOOL France SAS ROCKFON**
111, Rue du Château des Rentiers
75013 PARIS

N/Réf. : BR-70020399
26024612
TB/GA

TEST SCOPE

Determination of the sound absorption coefficient α_s of ceiling panels.

REFERENCE TEXTS

The measurements are carried out according to the Standard NF EN ISO 354 (2004) supplemented by NF EN ISO 11654 (1997) for the expression of the weighted sound absorption coefficient α_w.

Tests carried out on the suspended ceiling conformity process based upon the harmonised Standard NF EN 13964, as part of the conformity attestation procedure laid down by the European construction products directive (Council Directive 89/106/CEE): initial type testing.

CSTB has been notified by France to the European Commission under no. 0679, in order to perform these tests.

TEST SPECIMEN

Date of reception in the laboratory	: February 4th, 2010
Origin	: Requester
Installation	: CSTB

SUMMARY LIST OF TESTS

The samples were selected by the manufacturer as being representative of the current production at the factory of Cigacice (POLAND). See Appendix 4.

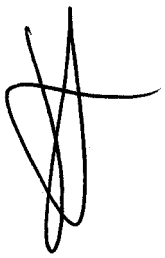
Test n°	Object submitted for testing:
1	Ceiling panels SONAR dB 40 E24S8, with 300 mm high plenum

Prepared at Marne-la-Vallée, 26 March 2010

Responsible for the test

Thibaut BLINET

Head of division



Jean-Baptiste CHÉNÉ

TEST REPORT N° AC10-26024612

DESCRIPTION AND INSTALLATION OF SUSPENDED CEILING PANELS

Test 1
Date 17/02/10
Station ALPHA

REQUESTER, MANUFACTURER **ROCKFON (ROCKWOOL SAS)**

NAME **SONAR dB 40 E24S8**

FITNESS FOR PURPOSE **Unchecked**

CONFIGURATION **With 300 mm high plenum**

MAIN CHARACTERISTICS

Dimensions in mm : 2923 x 3510
Area in m² : 10.26
Thickness in mm : 30
Mass per unit area in kg/m² : 5.4
Mounting type : E-330

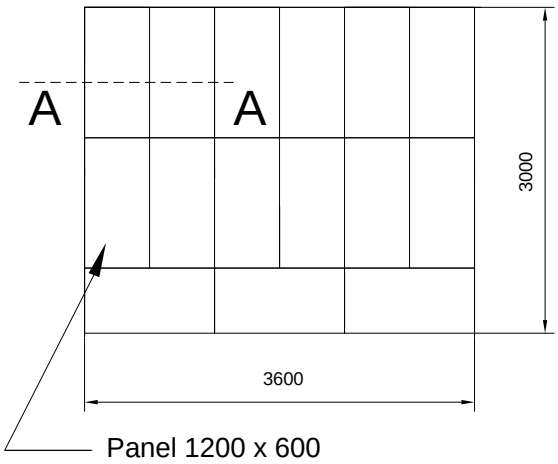
DESCRIPTION (dimensions are given in mm)

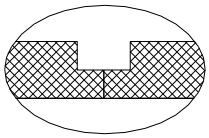
Panels	
Reference	Sonar dB 40
Dimensions	1200 x 600 x 30
Composition	Semi-rigid panels are made from stone wool of density 150 kg/m^3. The front face is coated with a painting foil of glass mineral and the back of airtight membrane (high-performance membrane).
Edge detail	E24 – Rebated edge

INSTALLATION (dimensions are given in mm)

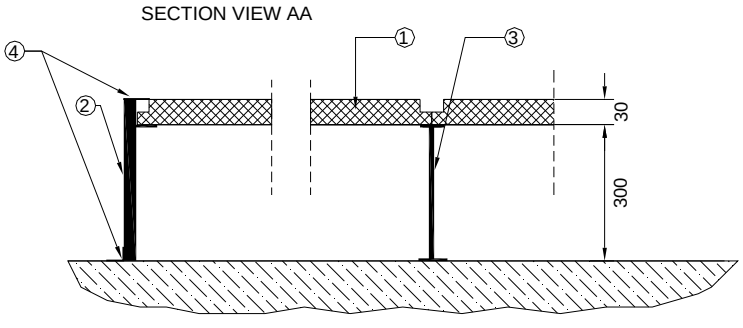
The panels are put edge to edge with the painted face visible, on supports in order to create a pattern of 1200 x 600 inside a metallic frame laid on the floor.

The whole assembly is set up to create a 300 high plenum and joints are placed between frame and floor of the reverberation room and between frame and the upper panels.





Dimensions in mm



① Panels SONAR dB40
② Metallic frame
③ Support
④ Revolving continuous joint

TEST REPORT N° AC10-26024612

SOUND ABSORPTION COEFFCIENT α_s OF SUSPENDED CEILING PANELS

AA45

Test 1
Date 17/02/10
Station ALPHA

REQUESTER, MANUFACTURER ROCKFON (ROCKWOOL SAS)

NAME SONAR dB 40 E24S8

FITNESS FOR PURPOSE Unchecked

CONFIGURATION With 300 mm high plenum

MAIN CHARACTERISTICS

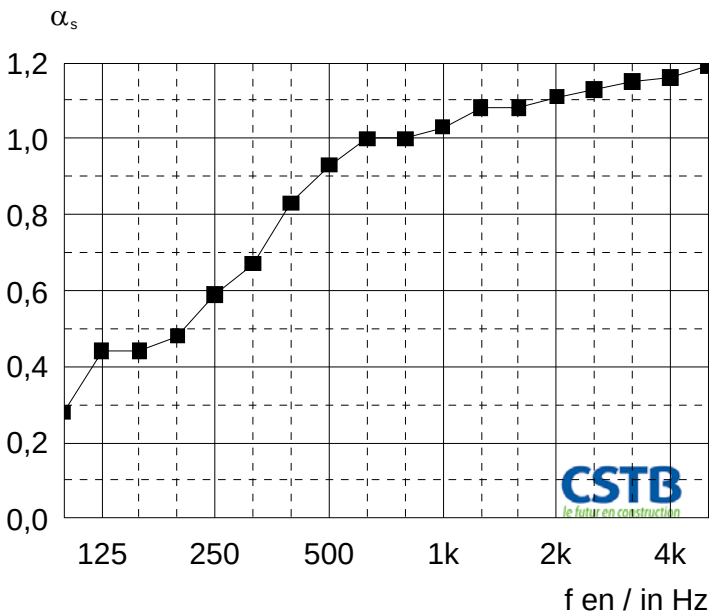
Dimensions in mm : 2923 x 3510
Area in m² : 10.26
Thickness in mm : 30
Mass per unit area in kg/m² : 5.4
Mounting type : E-330

MEASUREMENT CONDITIONS

Empty room:
Temperature: 21 °C
Relative humidity: 41 %

Room with sample:
Temperature: 21 °C
Relative humidity: 42 %

RESULTS



f	α_s
100	0,28
125	0,44
160	0,44
200	0,48
250	0,59
315	0,67
400	0,83
500	0,93
630	1,00
800	1,00
1000	1,03
1250	1,08
1600	1,08
2000	1,11
2500	1,13
3150	1,15
4000	1,16
5000	1,19
Hz	

α_w = 0,90
classement / class: A

It is strongly recommended to use this single number rating in combination with the complete sound absorption coefficient curve.

REVERBERATION TIME T

Date 17/02/10
Station ALPHA

TEST N° 1

f (Hz)	T of the empty room (s)	T of the room with sample (s)
100	11,30	6,24
125	10,99	4,93
160	10,84	4,89
200	9,40	4,38
250	9,35	3,92
315	9,54	3,64
400	8,88	3,11
500	8,56	2,85
630	8,21	2,67
800	7,73	2,61
1000	7,18	2,50
1250	6,70	2,37
1600	5,72	2,23
2000	5,10	2,10
2500	4,29	1,93
3150	3,44	1,73
4000	2,59	1,48
5000	2,00	1,26

ASSESSMENT OF THE REPEATABILITY COEFFICIENT “r”

Date 06/10/98
Station ALPHA

Design: 100 mm high rockwool panel

f (Hz)	r
100	0.03
125	0.07
160	0.05
200	0.10
250	0.08
315	0.04
400	0.03
500	0.06
630	0.04
800	0.06
1000	0.02
1250	0.02
1600	0.02
2000	0.03
2500	0.06
3150	0.02
4000	0.05
5000	0.04

APPENDIX 1
ANALYSIS PROCEDURE AND EXPRESSION OF THE RESULTS

METHOD OF MEASUREMENT: STANDARD NF EN ISO 354 (2004)

The Standard NF EN ISO 354 is the method of measurement of sound absorption in a reverberation room of materials used for the treatment of walls, floors, ceilings or separate objects. The method of noise interrupted is adopted to determine the curves decrease noise in a reverberation room of 252 m^3, equipped with 12 broadcasters.

Measure per one-third octave, 100-5000 Hz:
- of reverberation time of the empty room T1 and temperature at time t1 of the measure.
- of the length of reverberation of the hall with sample T2 and temperature at the time t2 of the measure.

Calculation of equivalent absorption area in A_T in m^2 for each one-third octave:

$$A_T = 55{,}3V\left(\frac{1}{c_2 T_2} - \frac{1}{c_1 T_1}\right) - 4V(m_2 - m_1)$$

V : Volume of the hall in m^3

c_i : Speed of sound in m/s ($c_i = 331 + 0{,}6t_i$) with t_i the temperature in Celsius degrees and 15 °C< t <30 °C)

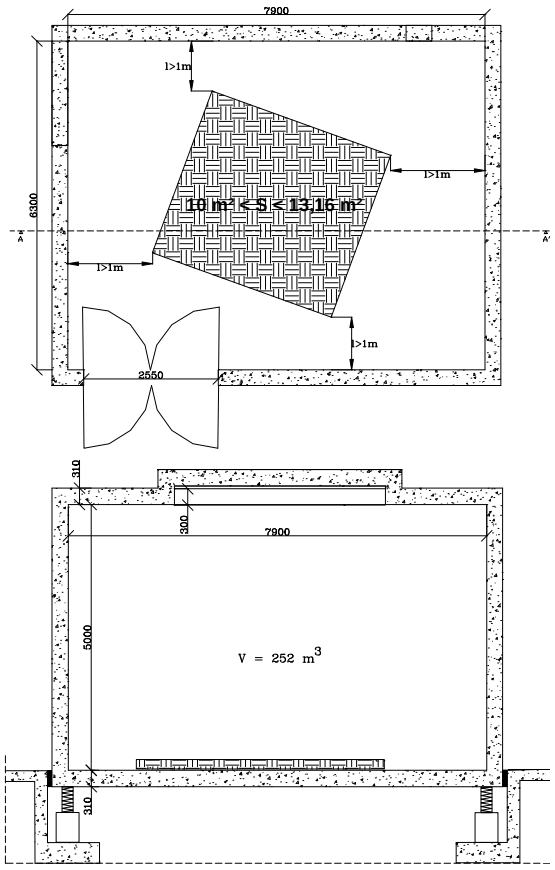
m_i : Attenuation coefficient of power in m^{-1} calculating using ISO 9613-1.

$$m_i = \frac{\alpha}{10\log(e)}$$

Calculation of the absorption coefficient (dimensionless) in the case of plane products for each one-third octave:

$$\alpha_s = A_T / S$$

S : Area of sample in m^2



EXPRESSION OF RESULTS: CALCULATION OF THE SINGLE INDEX α_w ACCORDING TO THE STANDARD NF EN ISO 11654 (1997)

Taking into account the values of α_s per octave between 250 and 4000 Hz with an accuracy to 0.05.

Vertical displacement of a reference curve by jumping from 0.05 until the sum of unfavourable deviation is the largest while remaining less than or equal to 0.1.

The value for α_w is recorded as the value of the reference curve at 500 Hz.

There is no overall index for the equivalent absorption area, within the meaning of NF EN ISO 11654, it is given in one-third octave. But the French legislation is based on a total value, which is calculated as following : A = S x α_w.

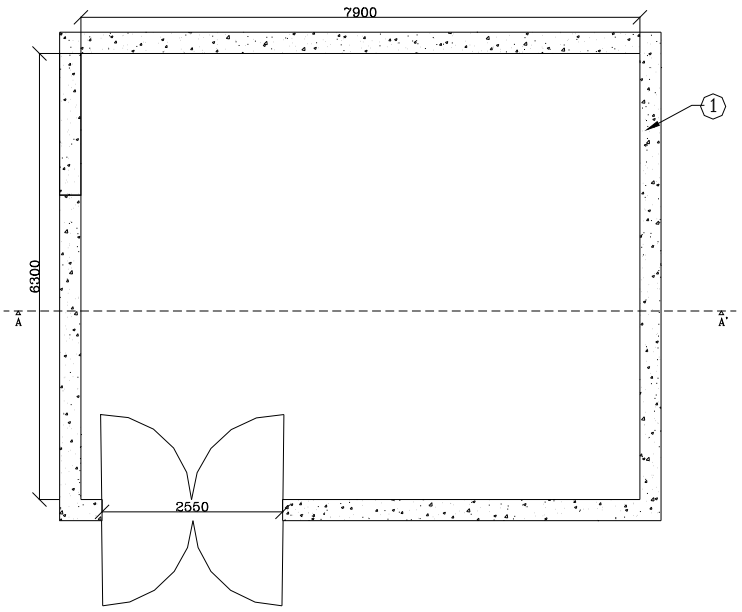
APPENDIX 2 – EQUIPMENT | ALPHA STATION

DESIGNATION	BRAND	TYPE	N° CSTB
Microphone network	Bruël & Kjær Bruël & Kjær	Microphone 4166 Pre-amplifier 2669	CSTB 01 0221
Microphone network	Bruël & Kjær Bruël & Kjær	Microphone 4166 Pre-amplifier 2669	CSTB 04 1519
Rotating arm	Bruël & Kjær	3923	CSTB 97 0162
Amplifier	CARVER	PM600	CSTB 91 0119
Speaker	CSTB-ELECTRO VOICE	Pyramide	CSTB 97 0208
Speaker	CSTB-ELECTRO VOICE	Pyramide	CSTB 97 0205
Real Time Analyser	Bruël & Kjær	2144	CSTB 00 0145
Microcomputer	DELL	OPTIPLEX GX 270	
Calibrator	Bruël & Kjær	4231	CSTB 04 1839
Temperature and humidity transmitter	SPSI	Hygrometer Thermometer	CSTB 97 0154
Pressure transmitter	MTE INSTRUMENTS	AIRFLOW P	CSTB 97 0158

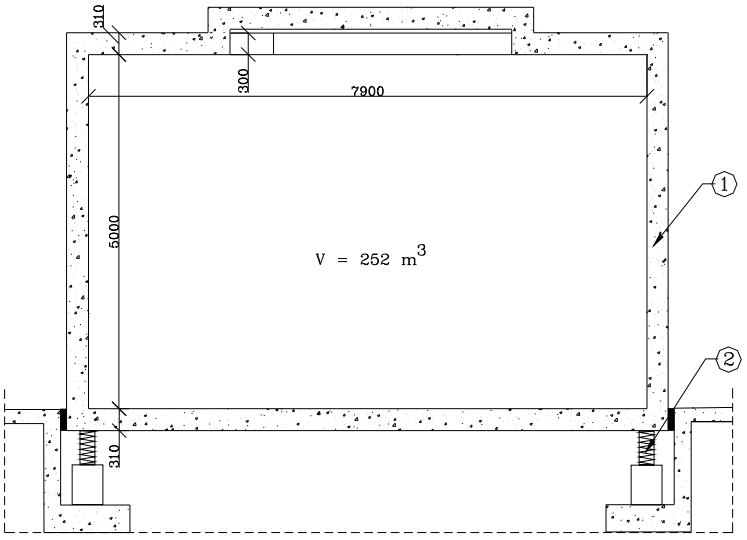
Script of measurement: 5 positions for every microphone (2 microphones) and for every speaker (2 fixed speakers).

APPENDIX 3 – DRAWINGS OF THE TEST STATION | ALPHA STATION

SCHEME



SECTION AA'



dimensions in mm

REP	DESIGNATION	Scale: 1/100
	Total area of walls: 243.8 m²	
	Test station equipped of 12 diffusers:	ALPHA STATION (ABSORPTION)
	7 diffusers of 2,05x1,05 m, 4 diffusers of 2x1,20 m and 1 diffuser of 3x1,05 m	
2	Spring box	
1	Concrete	ACOUSTICS

APPENDIX 4 - SAMPLING FORM

BELGIAN CONSTRUCTION CERTIFICATION ASSOCIATION npo
BCCA

Founded by : BBRI and SECO

SAMPLING FORM

Sampling is done by the manufacturer based on a prearranged sampling plan.
Data concerning identification and traceability are handed over by the manufacturer to BCCA.

Product:	mineral wool, suspended ceiling membrane, EN 13964	Mark:	CE

File n° BCCA:	BC1-533-1817	Sampling n°:	CIG - SA
		Date:	09/02/2010
Representative:	Jan Verbeke	Location:	Cigacice (Poland)
		Visit n°:	-

Manufacturer:	Rockwool Polska Sp.zo.o	Contact person:	Mr. Artur Nehring
address:	u.l. Kwatowa 14 66 131 Cigacice Poland	Tel.:	0048 68 38 50 250
		Fax:	0048 68 38 50 511
		Email:	artur.nehring@rockwool.pl

Nature of samples:	Dimensions:	Production date: (production code)
Sonar dB 40 E24S8 (8.601.00 PL)	1200x600x30mm (4 boxes)	11/01/2010

Tests	Test method	Number of tests	Dimensions of test samples	Identification
Sound Absorption	EN ISO 354 : 2003	1		

Laboratory:	CSTB Division Laboratoire d'Essais Acoustiques, att: Alexandre Cancian 84, Avenue Jean Jaurès, F-77447 Marne-la-Vallée Cedex 2
Test reports available before:	-
Invoice must be send to:	Rockfon, Rockwool A/S, Hovedgaden 501, 2640 Hedehusene, Denmark
Number of reports (+ language):	1 (language = ENGLISH)
Reports must be send to:	Rockfon, Rockwool A/S, Hovedgaden 501, 2640 Hedehusene, Denmark
Remarks:	

Representative BCCA:	Manufacturer: (2) for approval	Carrier: (3) For execution of the mission	Laboratory: (4) For reception of the samples and acception of the execution
Name *Jan Verbeke*	Name *Cécile Vassart*	Name	Name
signature	signature	signature	signature
date *09/02/2010*	date *9/2-2010*	date	date

Remarks :
(1) The laboratory shall follow the confidential rules, given in NBN EN 17025.
(2) The producer accept by the signature of his delegate all modalities mentioned on this document. He will send an order form for ditto to the indicated laboratory
(3) The carrier of the sample confirms by his signature the delivering of the sample at the laboratory.
(4) The laboratory confirms by the signature of his delegate the arrival of the sample, the test modalities and the term of execution of the tests. He will send within 7 days after arrival of the sample a copie of this document to SECO/BCCA
(5) If the laboratory can not accept the mission, SECO/BCCA shall be informed within 4 days, so that the necessary actions can be taken.
(6) The laboratory shall inform SECO/BCCA of every failure detected on the samples and every problem appearing during the handling and testing, as soon as possible.

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END OF REPORT