

KG/KVB



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Dear Arsene

**Concerne: Rapport d'Essai SRL n° C/98/5L/7486/1
Détermination du coefficient d'absorption Acoustique**

Le 14 Mars 2006

Nous attestons que le produit, objet du rapport d'essai ci-dessus, correspond précisément à une dalle de fibre minérale fabriquée dans notre usine de :

. STAFFORD en ANGLETERRE

en densité > 400 Kg/m³, épaisseur 15 et 19 m/m, finement perforée sur la face vue, puis revêtue d'un voile de verre poreux blanc, lisse.

- Description du SRL:
« NEEDLEPOINT (trous d'aiguilles)
TISSUE FACED » (revêtu tissu)
- Appellation commerciale CEP Ceilings pour le marché Anglais :
« ACOUSTIQUE SPEECHCHECK »
- Appellation commerciale PROTISOL pour le marché Français :
« SOLITEX ACOUSTIQUE »

Le produit, indépendamment des noms commerciaux précités est strictement le même dans ses caractéristiques et performances.

A handwritten signature in blue ink, appearing to read 'Kevin Gale', is written over the printed name below.

Signé : Kevin GALE - Directeur du Marketing

S R L

SOUND RESEARCH LABORATORIES LTD

CONSULTANTS IN NOISE AND VIBRATION

HEAD OFFICE & LABORATORY:

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TECHNICAL REPORT

THE LABORATORY DETERMINATION OF THE
RANDOM INCIDENCE SOUND ABSORPTION COEFFICIENT
OF VARIOUS TYPES OF CEILING TILE MANUFACTURED
BY CEP CEILINGS LTD

Prepared for

CEP CEILINGS LTD

Verulam Road

Stafford

ST16 3EA

By

J C SOPP

Report Number: C/98/5L/7486/1

Date: 21 October 1998

1. BRIEF FOR COMMISSION

To undertake laboratory measurements to determine the random incidence absorption coefficient of a selection of mineral fibre tiles laid over a 300mm void.


The tests to be carried in accordance with BS EN 20354:1993, over the 1/3rd octave band frequency range 50Hz to 10 000Hz.

The frequency range is beyond that required by the test Standard.

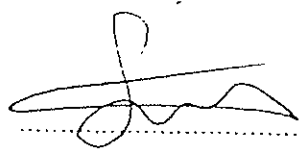
2. SUMMARY

Test in accordance with the brief have been undertaken in the reverberation chamber of SRL's Laboratory at Holbrook House, Sudbury, Suffolk.

From these measurements the required results have been derived and are presented in both tabular and graphic form in Tables 1 to 8 and Graphs 1 to 8.



J C SOPP
Technical Development



A SMALLS
Laboratory Manager

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3. DETAILS OF MEASUREMENTS

3.1 Location

Sound Research Laboratories Ltd
Holbrook House
Little Waldingfield
Sudbury
Suffolk
CO10 0TH

3.2 Test Dates 2nd October 1998

3.3 Instrumentation and Apparatus Used

<u>Make</u>	<u>Description</u>	<u>Type</u>
E D I	Microphone Multiplexer Microphone Power Supply Unit	
Norwegian Electronics	Real Time Analyser	830
Olivetti	Computer	M290S
Bruel & Kjaer	12mm Condenser Microphones Windshields Pre Amplifiers Microphone Calibrator	4166 UA0237 2639 4230
Larson Davis	12mm Condenser Microphone	2560
SRL	Power Amplifiers	
Celestion	Loudspeakers	100w
Solomat Mfs	Multimeter 226 RH Probe	MPM500e PT100

3.4 References

BS EN 20354:1993
ISO 354
Method for measurement of sound absorption in
a reverberation room

3.5 Personnel Present

B.N. Johnson CEP Ceilings Ltd

4. DESCRIPTION OF TEST

4.1 Description of Sample

The following mineral fibre ceiling tiles were presented for test.

4.1.7 Needle point. Tissue faced. *Table 7*

Tiles were 600 x 600 x 15mm thick tested over a 300mm void.

Sample area = 12m²

Temperature = 17.0°C

Relative Humidity = 72%

4.2 Sample Delivery date

1st October 1998

4.3 Test Procedures

The tiles were mounted over a 300mm void and tested in accordance with the relevant standard. The method and procedure is described more fully in Appendix 1.

5. RESULTS

The results of the measurements and subsequent analysis is given in Tables 1 to 8 and Graphs 1 to 8.

Table 7
Random Incidence Sound Absorption Coefficients
and Equivalent Sound Absorption Areas

CEP Ceiling Tiles; 600x600mm ; 15mm thick; Needlepoint, Tissue Faced

Sample Area (m ²): 12.0	Room Temperature (Deg C): 17.0	Void Depth (mm): 300
Room Volume (m ³): 300	Humidity(% RH): 72	

Frequency Hz	Test 7			
	T1, secs	T2, secs	Equivalent Sound Absorption Area, m ²	Sound Absorption Coefficient
	1/3 Oct.	1/3 Oct.	1/3 Oct.	1/3 Oct.
50*	5.39	3.97	3.22	0.27
63*	4.89	3.33	4.65	0.39
80*	5.26	3.84	3.41	0.28
100	6.69	3.95	5.04	0.42
125	7.10	4.26	4.56	0.38
160	7.76	4.35	4.91	0.41
200	9.00	5.16	4.02	0.34
250	9.08	5.13	4.12	0.34
315	7.98	4.35	5.08	0.42
400	7.62	3.87	6.18	0.52
500	6.44	3.09	8.18	0.68
630	5.72	2.74	9.24	0.77
800	5.76	2.65	9.90	0.83
1000	6.35	2.76	9.95	0.83
1250	6.41	2.68	10.55	0.88
1600	5.79	2.55	10.66	0.89
2000	5.25	2.50	10.18	0.85
2500	4.62	2.35	10.16	0.85
3150	3.86	2.19	9.60	0.8
4000	3.24	1.98	9.54	0.8
5000	2.59	1.71	9.66	0.81
6300*	2.22	1.50	10.51	0.88
8000*	1.54	1.14	11.07	0.92
10000*	1.14	0.90	11.37	0.95

* Denotes frequencies outside the range covered by BS EN 20354: 1993

T1, empty room reverberation time
T2, reverberation time with sample

ACOUSTIC TEST CERTIFICATE



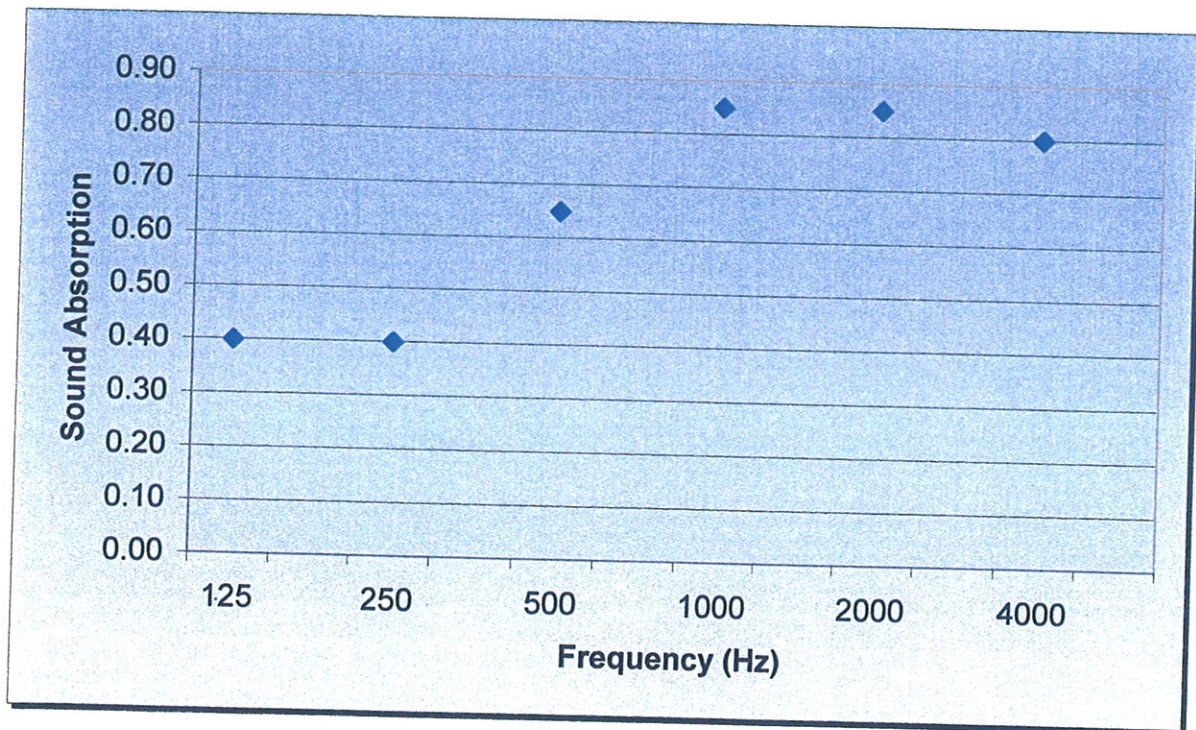
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Laboratory Measurement of Random Incidence Sound Absorption to BS EN 20354: 1993

Also in accordance with BS 3638: 1980 and ISO 354: 1985 NRC to ASTM C 423-90a

Sample Description:	CEP Acoustique High Density Mineral Fibre Tissue Faced
Cavity Depth:	300mm
Sample Area:	10.8m ²
Chamber Volume:	300m ³

Frequency (Hz)	125	250	500	1000	2000	4000	NRC
Sound Absorption	0.40	0.40	0.65	0.85	0.85	0.80	0.70



Test Organisation: Sound Research Laboratories

Report Number: C/98/5L/7486/1/7

CEP ref: MF/ABS/002/HEA/Fr



APPENDIX 1

Measurements of Random Incidence Sound Absorption Coefficients to BSEN 20354:1993/ISO 354:1985

The Laboratory determination of random incidence sound absorption coefficients is characterised by the corrected difference in decay rates in a reverberation room with and without the test sample installed.

The reverberation room is constructed from 215mm brick, which is internally plastered with a reinforced concrete roof and floor. The chamber has a volume of 300 cubic metres and is isolated by the use of resilient mountings and seals from the surrounding structure therefore ensuring good acoustic isolation.

Using at least two loudspeakers, narrow band random noise is produced in the room using an electronic generator and power amplifier. When the amplification system is switched off the decay of sound at any chosen frequency is filtered and measured. This process is repeated for each of the microphone positions and the values arithmetically averaged to obtain a final value for each frequency.

The sample, which has an area between 11.3m² and 13.6m² is then laid over a pre-assembled laboratory test rig positioned on the floor of the reverberation room so that no part of it is closer than one metre from any edge of the boundaries. The test rig provides a space beneath the sample, the depth of which can be varied to simulate specific requirements such as the void above a suspended ceiling system. The whole procedure of measuring the decay rates is then repeated.

The Sound Absorption Coefficients are calculated from the difference in decay rates for each frequency according to the formula:

$$a_s = \frac{A}{S}$$

where

a_s = is the random incidence absorption coefficient
 A = is the increase in absorption due to the introduction of the sample
 S = is the area of the sample

The increase in absorption is further defined as:

$$A = \left(\frac{55.3V}{c}\right)\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$$

where

V = is the volume of the reverberation room
 c = is the speed of sound
 T_2 = is the reverberation time in the room with sample installed

T_1 is the reverberation time in the empty room

It is occasionally found that the absorption coefficient derived in this manner reaches a value greater than unity. This is theoretically impossible by definition, and investigation has shown that this anomaly is due to diffraction of the impinging sound waves at the edges of the sample.