Technical Report

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Project

The Laboratory Determination of the Airborne Sound Transmission of a Plasterboard Partition Sealed with AVI Mastic

Prepared for

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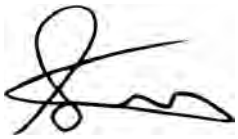
1.0 Summary

Tests have been done in SRL's Laboratory at Holbrook House, Sudbury, Suffolk, to determine the sound reduction index of a plasterboard partition sealed with sealant in accordance with BS EN ISO 140-3:1995.

From these measurements the required results have been derived and are presented in both tabular and graphic form in Data Sheets 1 and 2.

The results are given in 1/3rd octave bands over the frequency range 50Hz to 10kHz, which is beyond that required by the test standard. Measurements outside the standard frequency range are not UKAS accredited.



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Contents

2.0 Details of Measurements

2.1 Location

Sound Research Laboratories Ltd
Holbrook House
Little Waldingfield
Sudbury
Suffolk
CO10 OTH

2.2 Test Dates

14 August 2007

2.3 Instrumentation and Apparatus Used

Make	Description	Type
E D I	Microphone Multiplexer	
	Microphone Power Supply Unit	
Norwegian Electronics	Real Time Analyser	830
	Rotating Microphone Boom	231
Brüel & Kjaer	12mm Condenser Microphones	4166
	Windshields	UA0237
	Pre Amplifiers	2639
	Microphone Calibrator	4231
	Omnipower Sound Source	4296
Larson Davis	12mm Condenser Microphone	2560
SRL	Power Amplifiers	
Celestion	Loudspeakers	100w
Douglas Curtis	Rotating Microphone Boom	
Thermo Hygro	Temperature & Humidity Probe	
TOA	Graphic Equalizer	E-1231
	Power Amplifier	DPA-800

2.4 References

BS EN ISO 140-3:1995	Laboratory measurement of airborne sound insulation of building elements
BS EN ISO 717-1:1997	Rating of sound insulation in buildings and of building elements. Airborne Sound Insulation.

3.0 Description of Test

3.1 Description of Sample

Test 2 : An unsealed partition of one layer of 12.5mm Lafarge Wallboard Plasterboard each side of 100mm x 50mm timber studwork with two "straight through" gaps 1.2m high by 20mm wide, and unsealed perimeter. See diagram 1 for details.

Test 3: As test 2, partition sealed at perimeter both sides and both "straight through" gaps sealed both sides with AVI Mastic. See diagram 2 for details.

See also Photographs 1 to 3.

Sampling plan:	Samples selected at random
Sample condition:	New
Details supplied by:	Sealant details supplied by the test sponsor
Sample installed by:	SRL and the test sponsor

3.2 Sample Delivery date

14 August 2007

3.3 Test Procedures

The sample was mounted/located and tested in accordance with the relevant standard. The method and procedure is described in Appendix 1.

4.0 Results

The results of the measurements and subsequent analysis are given in Data Sheets 1 and 2 and summarised below.

Results relate only to the items tested.

SRL Test No.	Description in Brief	R_w (C; C_{tr}), dB
2	Partition unsealed	15 (0; 1)
3	Partition sealed	40 (-3; -8)

End of Text

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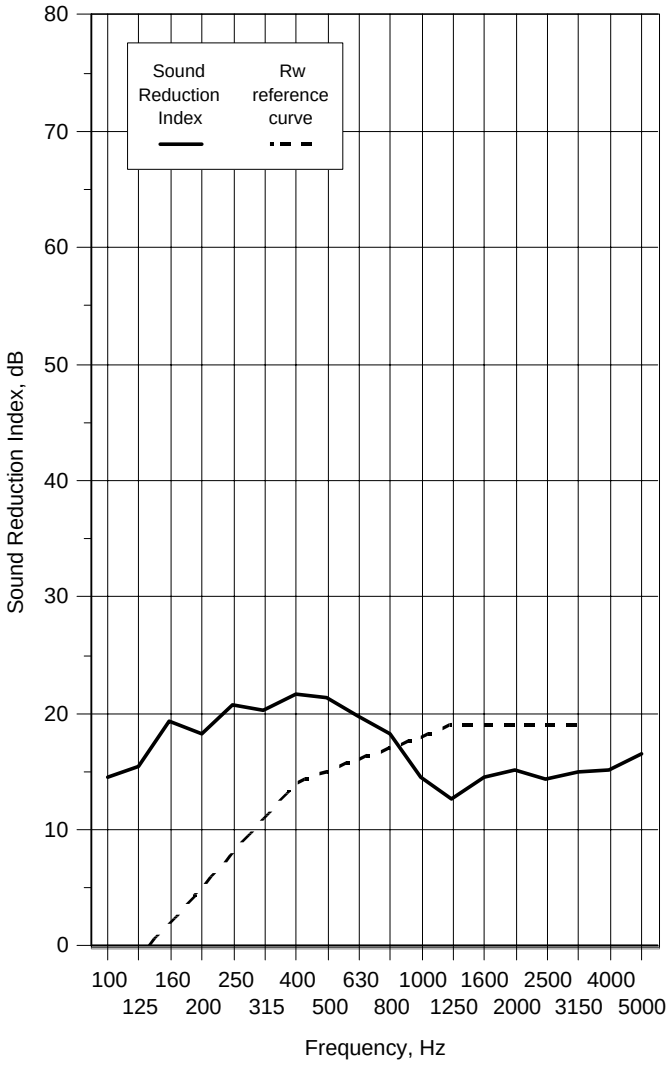
Data Sheet 1

Test Number :	2	**Air temperature:**	19.7 °C
Client:	Sponsor of Tests	**Air humidity:**	66 %
Test Date:	14/08/2007	**Receiving room volume**	300 m3
Sample height:	1.2 m	**Source room volume:**	115 m3
Sample width:	2 m	**Sample weight:**	17 kg/m2
Product Identification:	Partition unsealed		

Freq f Hz	Sound Reduction Index, dB 1/3 Oct	1/1 Oct
50+	8.8	
63+	14.7	9.6
80+	7.9	
100	14.5	
125	15.5	16.0
160	19.4	
200	18.2	
250	20.8	19.6
315	20.3	
400	21.7	
500	21.4	20.9
630	19.8	
800	18.2	
1000	14.6	14.6
1250	12.6	
1600	14.6	
2000	15.2	14.7
2500	14.3	
3150	15.0	
4000	15.2	15.5
5000	16.6	
6300+	18.0	
8000+	19.0	18.9
10000+	20.0	
Average 100-3150	17.3	



Rating according to BS EN ISO 717-1:1997

Rw(C;Ctr)= **15 (0; 1)** dB

Notes * designates measurement corrected for background

\# designates limit of measurement due to background

\+ designates frequency beyond standard and not UKAS accredited

v1.6

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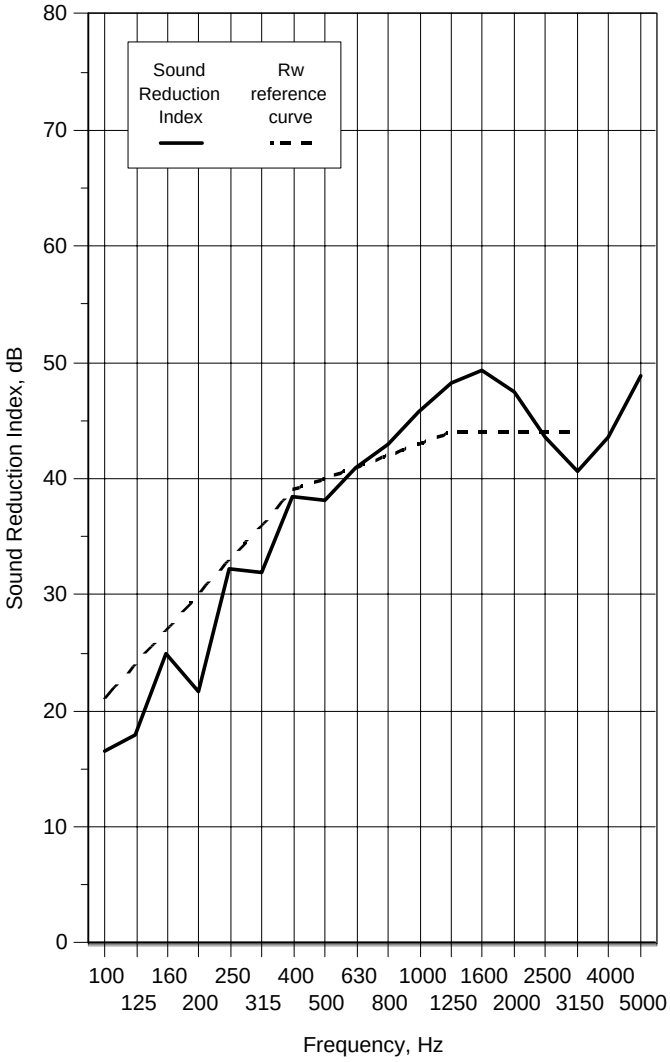
Data Sheet 2

Test Number :	3	**Air temperature:**	19.7 °C
Client:	Sponsor of Tests	**Air humidity:**	68 %
Test Date:	14/08/2007	**Receiving room volume**	300 m3
Sample height:	1.2 m	**Source room volume:**	115 m3
Sample width:	2 m	**Sample weight:**	17 kg/m2
Product Identification:	Partition sealed with AVI Mastic		

Freq f Hz	Sound Reduction Index, dB 1/3 Oct		1/1 Oct
50+	10.9		
63+	17.1		10.9
80+	8.5		
100	16.6		
125	18.0		18.7
160	25.0		
200	21.6		
250	32.3		25.6
315	31.9		
400	38.4		
500	38.2		39.0
630	41.0		
800	43.0		
1000	45.7		45.2
1250	48.3		
1600	49.3		
2000	47.5		46.1
2500	43.6		
3150	40.6		
4000	43.5		43.1
5000	48.8		
6300+	54.2		
8000+	57.4	*	56.6
10000+	59.9	#	
Average 100-3150	36.3		



Rating according to BS EN ISO 717-1:1997

Rw(C;Ctr)= **40 (-3;-8)** dB

Notes * designates measurement corrected for background

\# designates limit of measurement due to background

\+ designates frequency beyond standard and not UKAS accredited

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Photograph 1: Partially Unsealed Partition

Photograph 2: Partially Unsealed Partition Close-Up

Photograph 3: Partition Sealed Close-Up

Diagram 1:Partition Unsealed

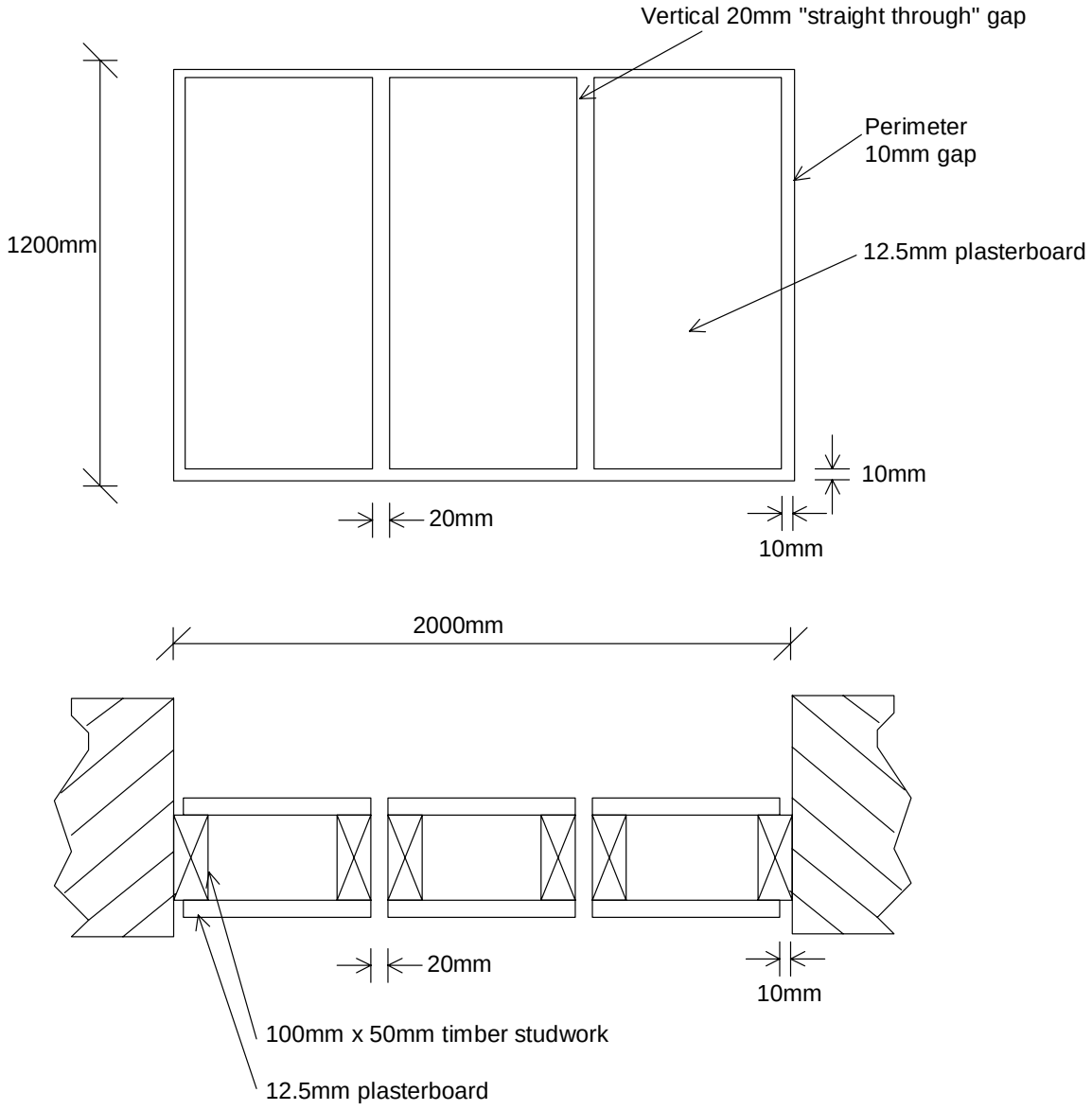

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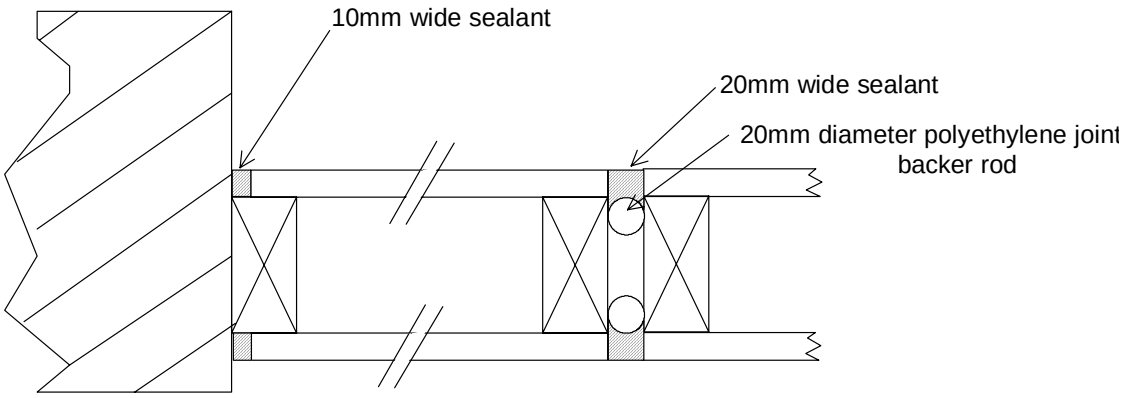
Diagram 2:Partition Sealed

Perimeter



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Appendix 1

Measurement of Sound Transmission in accordance with BS EN ISO 140-3 : 1995 - TP15

In the laboratory, airborne sound transmission is determined from the difference in sound pressure levels measured across a test sample installed between two reverberant rooms. The difference in measured sound pressure levels is corrected for the amount of absorption in the receiving room. The test is done under conditions which restrict the transmission of sound by paths other than directly through the sample. The source sound field is randomly incident on the sample.

The test sample is located and sealed in an aperture within the brick dividing wall between the two rectangular reverberant (i.e. acoustically "live") room, both of which are constructed from 215mm brick with reinforced concrete floors and roofs. The brick wall has dimensions of 4.8m wide x 3.1m high and 550mm nominal thickness and forms the whole of the common area between the two rooms.

One of the rooms is used as the receiving room and has a volume of 300 cubic metres. It is isolated from the surrounding structure and the adjoining room by the use of resilient mountings and seals ensuring good acoustic isolation. The adjoining source room has a volume of 115 cubic metres.

Broad band noise is produced in the source room from an electronic generator, power amplifier and loudspeaker. The resulting sound pressure levels in both rooms are sampled using a microphone mounted on an oscillating boom and connected to a real time analyser. The signal is filtered into one third octave band widths, integrated and averaged. The value obtained at each frequency is known as the average sound pressure level for either the source or the receiving room. The change in level across the test sample is termed the sound pressure level difference, i.e.

$$D = L_1 - L_2$$

where

D is the equivalent Sound Pressure level difference in dB

L_1 is the equivalent Sound Pressure level in the source room in dB

L_2 is the equivalent Sound Pressure level in the receiving room in dB

The Sound Reduction Index (R) also known by the American terminology Sound Transmission Loss, is defined as the number of decibels by which sound energy randomly incident on the test sample, is reduced in transmitting through it and is given by the formula:

$$R = D + 10\log_{10} \frac{S}{A} \text{..... in decibels}$$

where

S is the area of the sample

A is the total absorption in the receiving room

both dimensions being in consistent units

The Sound Reduction Index is an expression of the laboratory sound transmission performance of a particular element or construction. It is a function of the mass, thickness, sealing method of mounting etc. and is independent of the overall area of the sample.

However, when an example of this construction is installed on site, the sound insulation obtained will depend upon its surface area, as well as the absorption in the receiving room. The larger the area the greater the sound energy transmitted. Also, the overall sound insulation is affected by the sound transmission through other building elements, some of which may have an inferior performance to the sample tested. In practice, therefore, the potential sound reduction index of a construction is not fully realised on site. Furthermore, the sound reduction index of a particular sample of that construction can only be measured accurately in a laboratory, because only under such controlled conditions can the sound transmission path be limited to the sample under test.

R_{aw} is a single figure rating of sound insulation and is calculated in accordance with the relevant section of BS EN ISO 717-1:1997.

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Appendix 2

Measurement Uncertainty
BS EN ISO 140-3:1995 - TP15

The following values of uncertainty are based on a standard uncertainty multiplied by a coverage factor of k = 2, which provides a level of confidence of approximately 95%.

Frequency, Hz	Uncertainty, ± dB
100	2.6
125	2.4
160	2.1
200	2.1
250	1.5
315	1.5
400	1.2
500	1.2
800	1.0
1000	1.0
1250	1.0
1600	1.0
2000	1.0
2500	1.0
3150	1.0

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SRL offers services in:
Acoustics
Laboratory and Site Testing
Fire
BREEAM
Air Tightness

SRL's Laboratory is accredited for testing under UKAS Number 0444

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