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Technical Report

Report Number C/05/5L/3181/1b
(supersedes report no. C/05/5L/3181/1a)

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Project

**The Laboratory Determination of the
Airborne Sound Transmission of a
Plasterboard Partition Sealed with
Two Types of Everflex Sealant**

Prepared for

**Everbuild Building Products Ltd
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By

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0444

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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 two types of Everflex 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 to 4.

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.



.....
Allen Smalls
Laboratory Manager
Quality Manager



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Tom Gardner
Head of Testing

For and on behalf of
Sound Research Laboratories Ltd

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2.0 Details of Measurements

2.1 Location

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

2.2 Test Dates

25, 26 and 28 April 2005

2.3 Instrumentation and Apparatus Used

Make	Description	Type
E D I	Microphone Multiplexer Microphone Power Supply Unit	
Norwegian Electronics	Real Time Analyser Rotating Microphone Boom	830 231
Olivetti	Computer	M290S
Brüel & Kjaer	12mm Condenser Microphones Windshields Pre Amplifiers Microphone Calibrator Omnipower Sound Source	4166 UA0237 2639 4231 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.

2.5 Personnel Present

Nigel Lockwood - Everbuild Building Products Ltd

3.0 Description of Test

3.1 Description of Sample

Tests 2 and 5: An unsealed partition of one layer of 12.5mm Knauf 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 4: As test 2, partition sealed at perimeter both sides and both "straight through" gaps sealed both sides with Everflex AC50 Acoustic Sealant and Adhesive. See diagram 2 for details.

Test 7: As test 5, partition sealed at perimeter both sides and both "straight through" gaps sealed both sides with Everflex Fire Mate Sealant / Everflex AC95 Intumescent Acoustic Sealant / Everbuild Fireseal 300. See diagram 2 for details.

Note: Sealants left at least 24 hours before testing.

See also Photographs 1 to 5.

Sampling plan: Samples selected at random

Sample condition: New

Details supplied by: Sealant details supplied by Everbuild

Sample installed by: SRL and Everbuild

3.2 Sample Delivery date

25 April 2005

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 to 4 and summarised below.

Results relate only to the items tested.

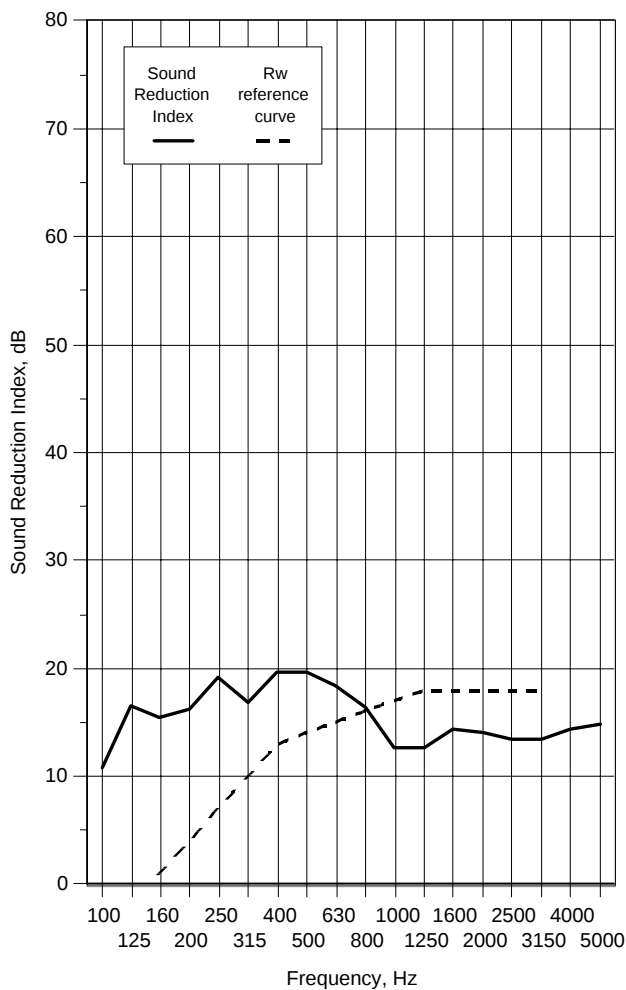
SRL Test No.	Description in Brief	R _w (C; C _{tr}), dB
2	Partition unsealed	14 (0; 1)
4	Partition sealed with Everflex AC50	39 (-3; -9)
5	Partition unsealed	15 (0; 0)
7	Partition sealed with Everflex AC95	38 (-2; -7)

————— *End of Text* —————

Data Sheet 1

Test Number : 2
Client: Everbuild Building Products
Test Date: 25/04/2005
Sample height: 1.2 m
Sample width: 2 m
Product Partition unsealed
Identification:
Air temperature: 13.4 °C
Air humidity: 70 %
Receiving room volume 300 m3
Source room volume: 115 m3
Sample weight: 17 kg/m2

Freq f Hz	Sound Reduction Index, dB	
	1/3 Oct	1/1 Oct
50+	13.5	12.6
63+	13.7	
80+	11.2	
100	10.8	13.5
125	16.6	
160	15.4	
200	16.2	17.2
250	19.2	
315	16.8	
400	19.6	19.2
500	19.7	
630	18.4	
800	16.4	13.6
1000	12.7	
1250	12.6	
1600	14.3	13.9
2000	14.1	
2500	13.4	
3150	13.5	14.2
4000	14.3	
5000	14.8	
6300+	16.9	17.9
8000+	17.8	
10000+	19.2	
Average 100-3150	15.6	



Rating according to BS EN ISO 717-1:1997

Rw(C;Ctr)= **14 (0; 1)** dB

Notes * designates measurement corrected for background

designates limit of measurement due to background

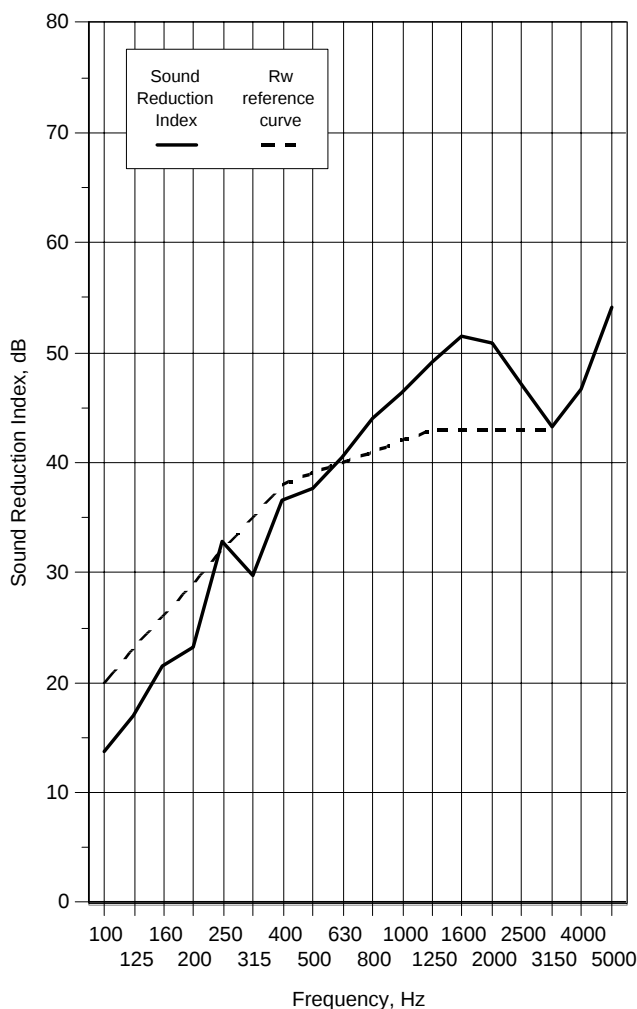
+ designates frequency beyond standard and not UKAS accredited

v15

Data Sheet 2

Test Number : 4
Client: Everbuild Building Products
Test Date: 26/04/2005
Sample height: 1.2 m
Sample width: 2 m
Product Identification: Partition sealed with Everflex AC50 Acoustic Sealant
Air temperature: 14.3 °C
Air humidity: 73 %
Receiving room volume 300 m3
Source room volume: 115 m3
Sample weight: 17 kg/m2

Freq f Hz	Sound Reduction Index, dB	
	1/3 Oct	1/1 Oct
50+	13.1	14.2
63+	17.5	
80+	13.3	
100	13.8	16.4
125	17.0	
160	21.5	
200	23.2	26.8
250	32.9	
315	29.8	
400	36.6	37.9
500	37.7	
630	40.4	
800	44.0	46.0
1000	46.3	
1250	49.1	
1600	51.5	49.4
2000	50.9	
2500	47.2	
3150	43.3	46.2
4000	46.7	
5000	54.2	
6300+	60.5	62.7
8000+	63.9 *	
10000+	65.1 #	
Average 100-3150	36.6	



Rating according to BS EN ISO 717-1:1997

Rw(C;Ctr)= **39 (-3;-9)dB**

Notes * designates measurement corrected for background

designates limit of measurement due to background

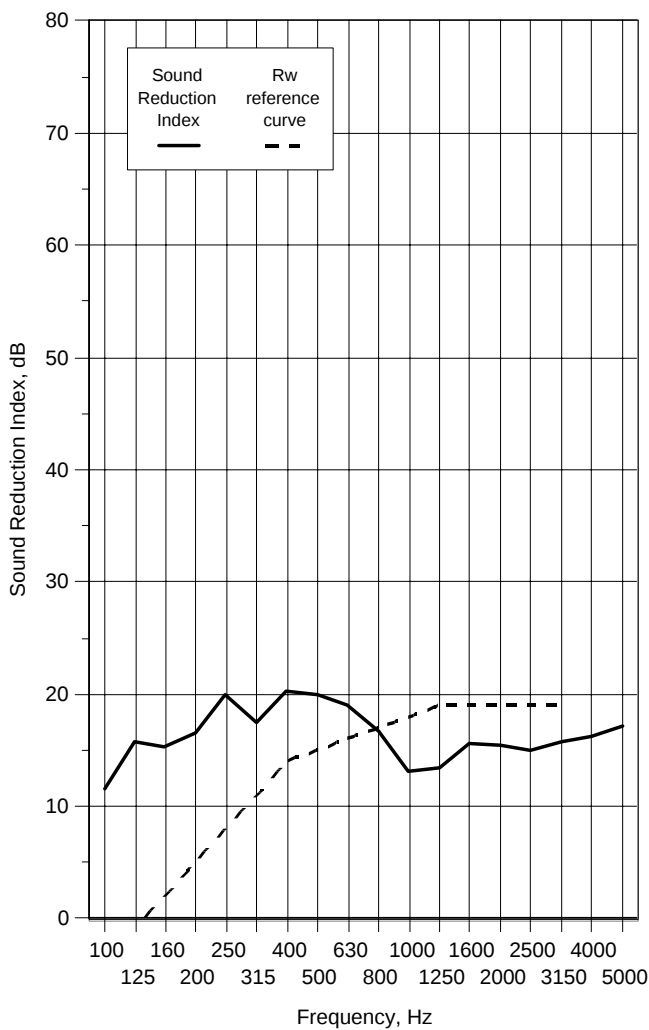
+ designates frequency beyond standard and not UKAS accredited

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Data Sheet 3

Test Number :	5	Air temperature:	14.3 °C
Client:	Everbuild Building Products	Air humidity:	73 %
Test Date:	26/04/2005	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	Partition unsealed		
Identification:			

Freq f Hz	Sound Reduction Index, dB	
	1/3 Oct	1/1 Oct
50+	11.7	10.7
63+	13.7	
80+	8.3	
100	11.6	13.8
125	15.8	
160	15.3	
200	16.5	17.8
250	20.0	
315	17.5	
400	20.3	19.7
500	19.9	
630	19.0	
800	16.7	14.1
1000	13.1	
1250	13.4	
1600	15.6	15.3
2000	15.4	
2500	15.0	
3150	15.7	16.4
4000	16.3	
5000	17.2	
6300+	18.6	19.4
8000+	19.1	
10000+	20.7	
Average 100-3150	16.3	



Rating according to BS EN ISO 717-1:1997

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

Notes * designates measurement corrected for background

designates limit of measurement due to background

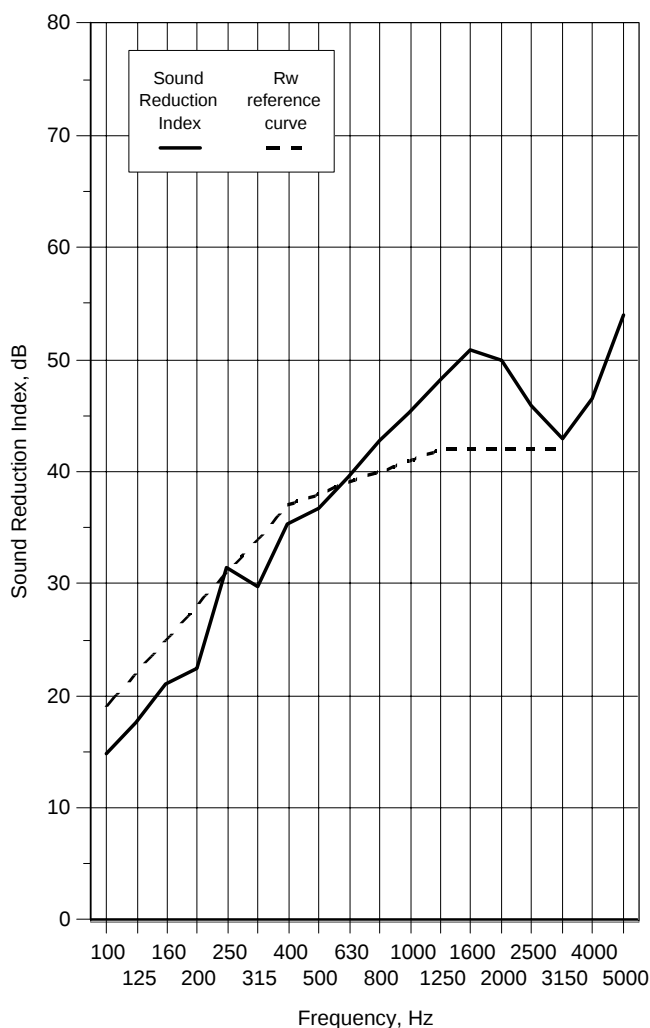
+ designates frequency beyond standard and not UKAS accredited

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Data Sheet 4

Test Number : 7
Client: Everbuild Building Products
Test Date: 28/04/2005
Sample height: 1.2 m
Sample width: 2 m
Product Identification: Partition sealed with Everflex AC95 Acoustic Sealant
Air temperature: 14.5 °C
Air humidity: 70 %
Receiving room volume 300 m3
Source room volume: 115 m3
Sample weight: 17 kg/m2

Freq f Hz	Sound Reduction Index, dB	
	1/3 Oct	1/1 Oct
50+	10.8	11.9
63+	16.4	
80+	10.7	
100	14.9	17.2
125	17.7	
160	21.0	
200	22.4	26.0
250	31.5	
315	29.8	
400	35.4	36.9
500	36.7	
630	39.5	
800	42.8	44.9
1000	45.3	
1250	48.2	
1600	50.8	48.3
2000	50.0	
2500	45.9	
3150	43.0	45.9
4000	46.5	
5000	54.0	
6300+	60.3	62.5
8000+	63.8	
10000+	64.5	
Average 100-3150	35.9	



Rating according to BS EN ISO 717-1:1997

Rw(C;Ctr)= **38 (-2;-7)** dB

Notes * designates measurement corrected for background

designates limit of measurement due to background

+ designates frequency beyond standard and not UKAS accredited

v15

Photograph 1: Unsealed Partition



Photograph 2: Unsealed Partition Close-Up



Photograph 3: Partially Unsealed Partition Close-Up



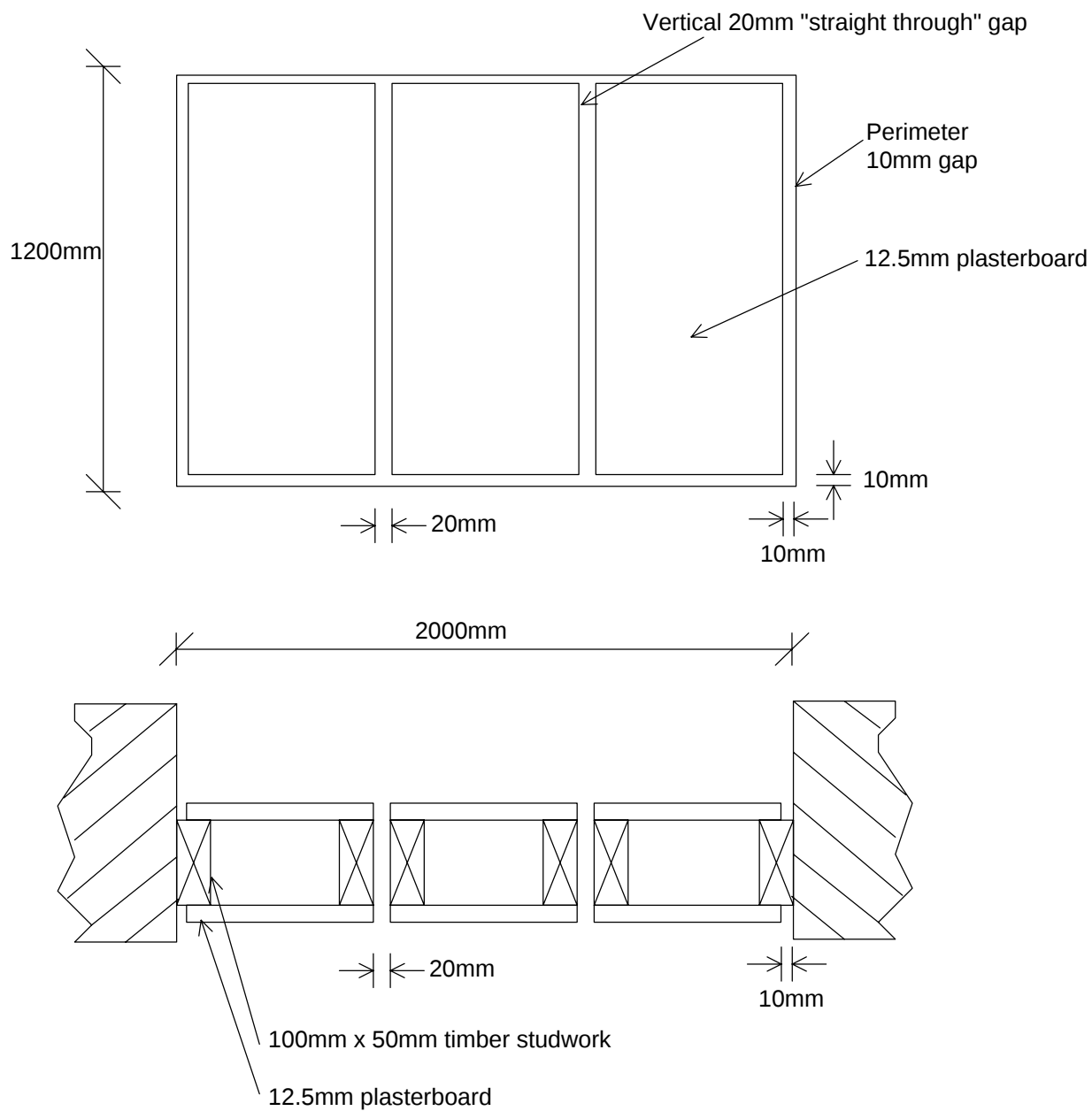
Photograph 4: Fully Sealed Partition Close-Up



Photograph 5: Fully Sealed Partition



Diagram 1: Partition Unsealed

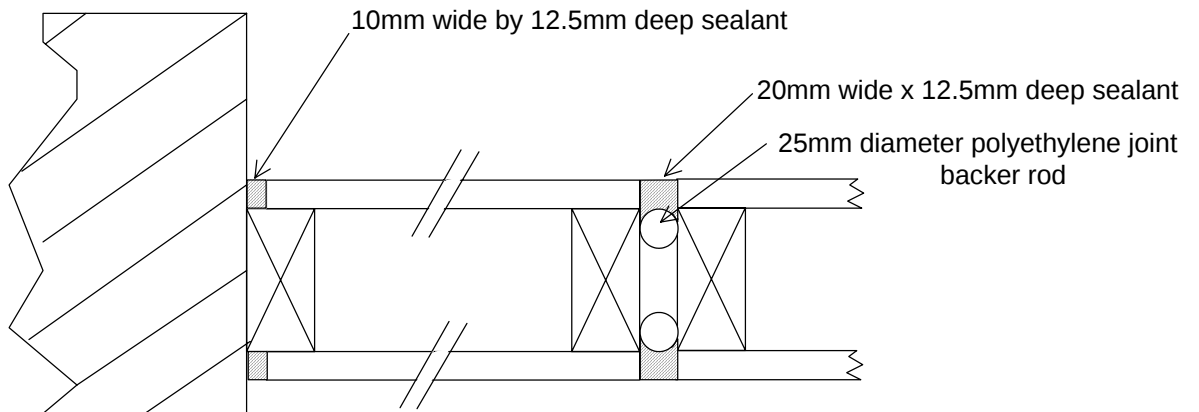


NOT TO SCALE

Diagram 2: Partition Sealed

As diagram 1, with perimeter and “straight through” gaps sealed as below.

Perimeter



NOT TO SCALE

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

L₁ is the equivalent Sound Pressure level in the source room in dB

L₂ 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:

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

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.

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, $\pm$ 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