

S R L



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Technical Report

Report Number C/07/5L/3731/1a
(supersedes report no C/07/5L/3731/1 dated 18/6/07)

Date 3 July 2007

Project

**The Laboratory Determination of
The Airborne Sound Transmission
of Various Party Block Walls**

Prepared for

**Plasmor Concrete Products
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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 airborne sound transmission of various masonry block walls 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 9.

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.



.....
Gareth Young
Project Engineer



.....
Allen Smalls
Laboratory Manager
Quality Manager

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

26, 27 & 29 March and 1, 2 & 4 May 2007

2.3 Instrumentation and Apparatus Used

Make	Description	Type
E D I	Microphone Multiplexer Microphone Power Supply Unit	
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

None

3.0 Description of Test

3.1 Description of Sample

Various single leaf block walls - both with and without finishes - were tested as follows:-

Test No. 2:	100mm Aglite block wall with 12.5mm Lafarge Wallboard plasterboard on dabs to source side only.
Test No. 4:	100mm Aglite block wall with 12.5mm Lafarge Wallboard plasterboard on dabs to both sides.
Test No. 5:	100mm Aglite block wall, bare faced.
Test No. 7:	100mm Aglite block wall with 2 coat wet plaster (nom. 10mm) to both sides.
Test No. 9:	140mm Aglite block wall with 12.5mm Lafarge Wallboard plasterboard on dabs to both sides.
Test No. 10:	140mm Aglite block wall with 12.5mm Lafarge Wallboard plasterboard on dabs to source side only.
Test No. 11:	140mm Aglite block wall, bare faced.
Test No. 12:	140mm Aglite block wall with 2 coat wet plaster (nom. 10mm) to source side only.
Test No. 14:	140mm Aglite block wall with 2 coat wet plaster (nom. 10mm) to both sides.

All blocks approximately 215mm x 415mm.

See drawings 1 to 9.

Approximately 12 dabs were used to secure each board. 2400mm x 1200mm boards.

Blocks sealed to test aperture using normal sand/cement mix. Plasterboard sealed into aperture with jointing compound and additional mastic.

Sampling plan:	New pallets of blocks selected at random. Plasterboard & plaster from top of pile.
Sample condition:	New
Details supplied by	Plasmor/SRL
Sample installed by	SRL

3.2 Sample Delivery date

23 March 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 to 9 and summarised below.

Results relate only to the items tested.

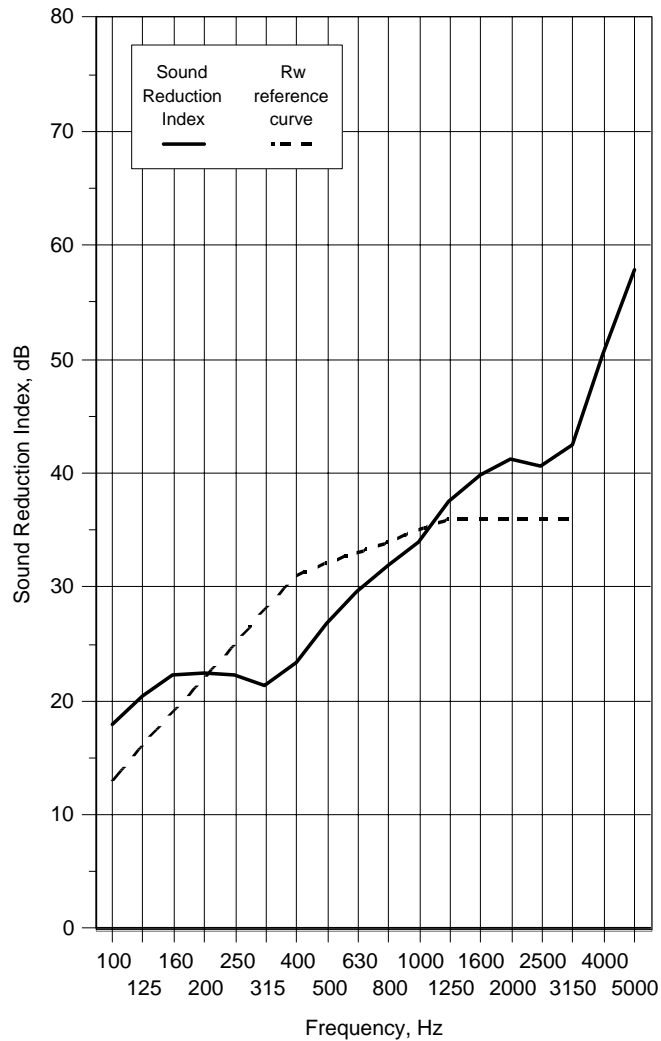
SRL Test No.	Description in Brief	R _w (C; C _{tr})
2	100mm Aglite block wall with 12.5mm Lafarge Wallboard plasterboard on dabs to source side only.	32 (-1;-4)
4	100mm Aglite block wall with 12.5mm Lafarge Wallboard plasterboard on dabs to both sides.	42 (-2;-6)
5	100mm Aglite block wall, bare faced.	18 (0;-1)
7	100mm Aglite block wall with 2 coat wet plaster (nom. 10mm) to both sides.	46 (-1;-4)
9	140mm Aglite block wall with 12.5mm Lafarge Wallboard plasterboard on dabs to both sides.	43 (-2;-6)
10	140mm Aglite block wall with 12.5mm Lafarge Wallboard plasterboard on dabs to source side only.	35 (-1;-5)
11	140mm Aglite block wall, bare faced.	21 (0;-2)
12	140mm Aglite block wall with 2 coat wet plaster (nom. 10mm) to source side only.	48 (-1;-5)
14	140mm Aglite block wall with 2 coat wet plaster (nom. 10mm) to both sides.	49 (-1;-4)

————— *End of Text* —————

Data Sheet 1

Test Number :	2	Air temperature:	12 °C
Client:	Plasmor Concrete Products	Air humidity:	68 %
Test Date:	26/03/2007	Receiving room volume	50 m3
Sample height:	2.925 m	Source room volume:	55 m3
Sample width:	3.845 m	Sample weight:	133 kg/m2
Product			
Identification:	100mm Aglite block wall with 12.5mm Lafarge Wallboard plasterboard on dabs to source side only.		

Freq f Hz	Sound Reduction Index, dB	
	1/3 Oct	1/1 Oct
50+	21.2	
63+	22.4	19.9
80+	17.6	
100	17.9	
125	20.4	19.8
160	22.3	
200	22.4	
250	22.3	22.0
315	21.4	
400	23.4	
500	26.8	25.8
630	29.6	
800	31.9	
1000	33.9	33.9
1250	37.5	
1600	39.8	
2000	41.3	40.5
2500	40.6	
3150	42.5	
4000	50.4	46.5
5000	57.9	
6300+	63.3	
8000+	64.4	61.4
10000+	58.7	*
Average 100-3150	29.6	



Rating according to BS EN ISO 717-1:1997

Rw(C;Ctr)= **32 (-1;-4)** dB

Notes * designates measurement corrected for background

designates limit of measurement due to background

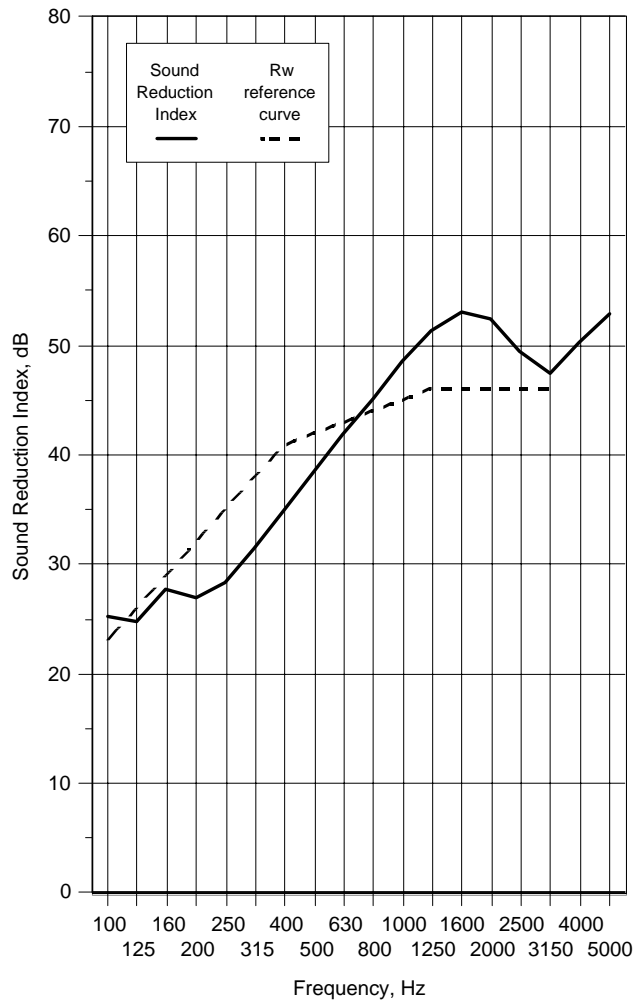
+ designates frequency beyond standard and not UKAS accredited

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Data Sheet 2

Test Number : 4 **Air temperature:** 12 °C
Client: Plasmor Concrete Products **Air humidity:** 66 %
Test Date: 27/03/2007 **Receiving room volume** 50 m3
Sample height: 2.925 m **Source room volume:** 55 m3
Sample width: 3.845 m **Sample weight:** 141 kg/m2
Product Identification: 100mm Aglite block wall with 12.5mm Lafarge Wallboard plasterboard on dabs to both sides.

Freq f Hz	Sound Reduction Index, dB	
	1/3 Oct	1/1 Oct
50+	17.7	21.0
63+	23.1	
80+	27.3	
100	25.2	25.7
125	24.8	
160	27.8	
200	27.0	28.5
250	28.3	
315	31.4	
400	35.0	37.6
500	38.5	
630	41.9	
800	45.2	47.6
1000	48.6	
1250	51.3	
1600	53.0	51.3
2000	52.4	
2500	49.4	
3150	47.4	49.6
4000	50.2	
5000	52.9	
6300+	56.8	57.9
8000+	58.7	
10000+	58.6	
Average 100-3150	39.2	



Rating according to BS EN ISO 717-1:1997

Rw(C;Ctr)= **42 (-2;-6) dB**

Notes * designates measurement corrected for background

designates limit of measurement due to background

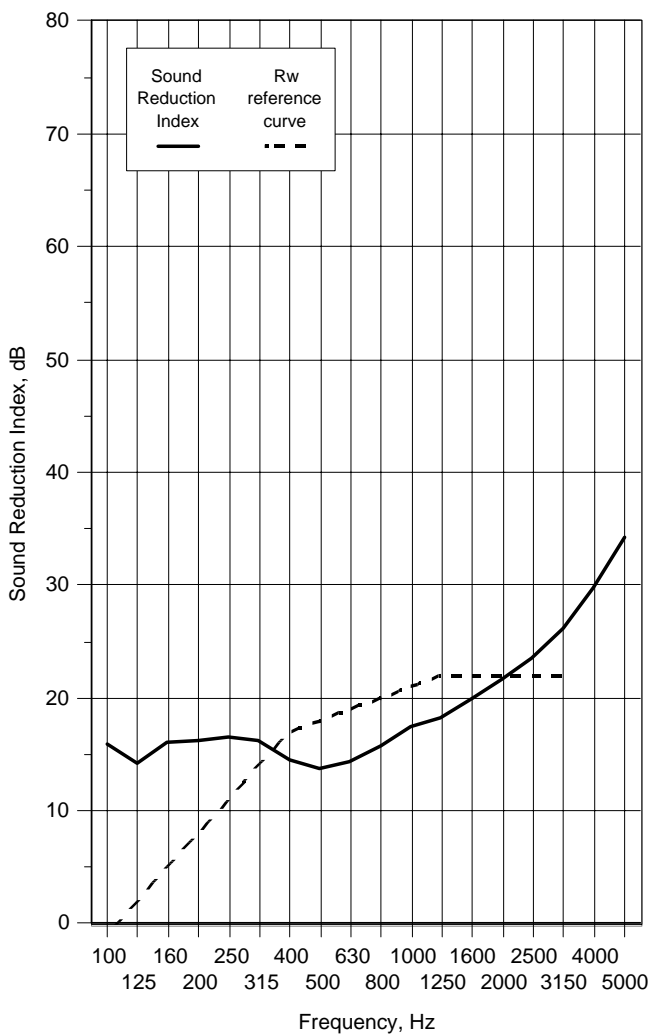
+ designates frequency beyond standard and not UKAS accredited

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Data Sheet 3

Test Number : 5 **Air temperature:** 15.4 °C
Client: Plasmor Concrete Products **Air humidity:** 58 %
Test Date: 27/03/2007 **Receiving room volume** 50 m3
Sample height: 2.925 m **Source room volume:** 55 m3
Sample width: 3.845 m **Sample weight:** 125 kg/m2
Product
Identification: 100mm Aglite block wall, bare faced.

Freq f Hz	Sound Reduction Index, dB	
	1/3 Oct	1/1 Oct
50+	11.9	12.0
63+	12.6	
80+	11.6	
100	15.9	15.3
125	14.2	
160	16.0	
200	16.3	16.4
250	16.6	
315	16.3	
400	14.5	14.2
500	13.8	
630	14.4	
800	15.8	17.0
1000	17.4	
1250	18.2	
1600	19.9	21.4
2000	21.6	
2500	23.5	
3150	26.1	28.9
4000	29.7	
5000	34.2	
6300+	42.0	45.1
8000+	48.6	
10000+	48.1	
Average 100-3150	17.5	



Rating according to BS EN ISO 717-1:1997

Rw(C;Ctr)= 18 (0;-1) dB

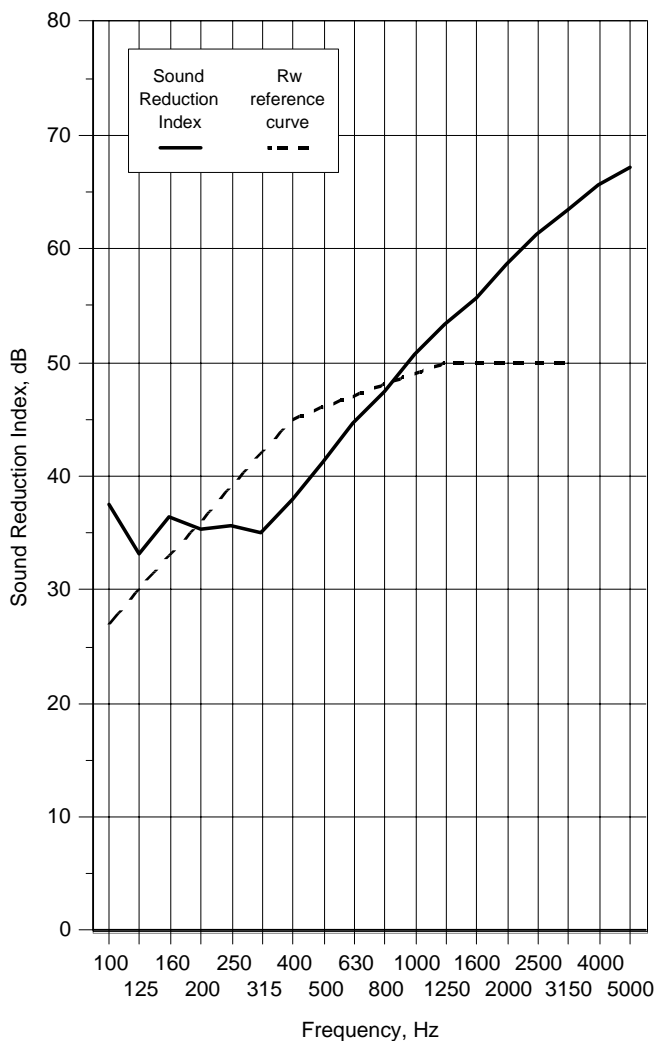
Notes * designates measurement corrected for background
 # designates limit of measurement due to background
 + designates frequency beyond standard and not UKAS accredited

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Data Sheet 4

Test Number :	7	Air temperature:	13.5 °C
Client:	Plasmor Concrete Products	Air humidity:	79 %
Test Date:	29/03/2007	Receiving room volume	50 m ³
Sample height:	2.925 m	Source room volume:	55 m ³
Sample width:	3.845 m	Sample weight:	135 kg/m ²
Product			
Identification:	100mm Aglite block wall with 2 coat wet plaster (nom. 10mm) to both sides.		

Freq f Hz	Sound Reduction Index, dB	
	1/3 Oct	1/1 Oct
50+	19.6	23.0
63+	24.3	
80+	35.4	35.3
100	37.5	
125	33.1	
160	36.4	
200	35.4	35.4
250	35.7	
315	35.1	
400	38.0	
500	41.3	40.5
630	44.6	
800	47.5	49.9
1000	50.7	
1250	53.4	
1600	55.7	57.9
2000	58.6	
2500	61.3	
3150	63.5	65.2
4000	65.7	
5000	67.2	
6300+	68.7	66.1
8000+	68.1	
10000+	63.5	
Average 100-3150	45.5	



Rating according to BS EN ISO 717-1:1997

Rw(C;Ctr) = **46 (-1;-4)** dB

Notes * designates measurement corrected for background

designates limit of measurement due to background

+ designates frequency beyond standard and not UKAS accredited

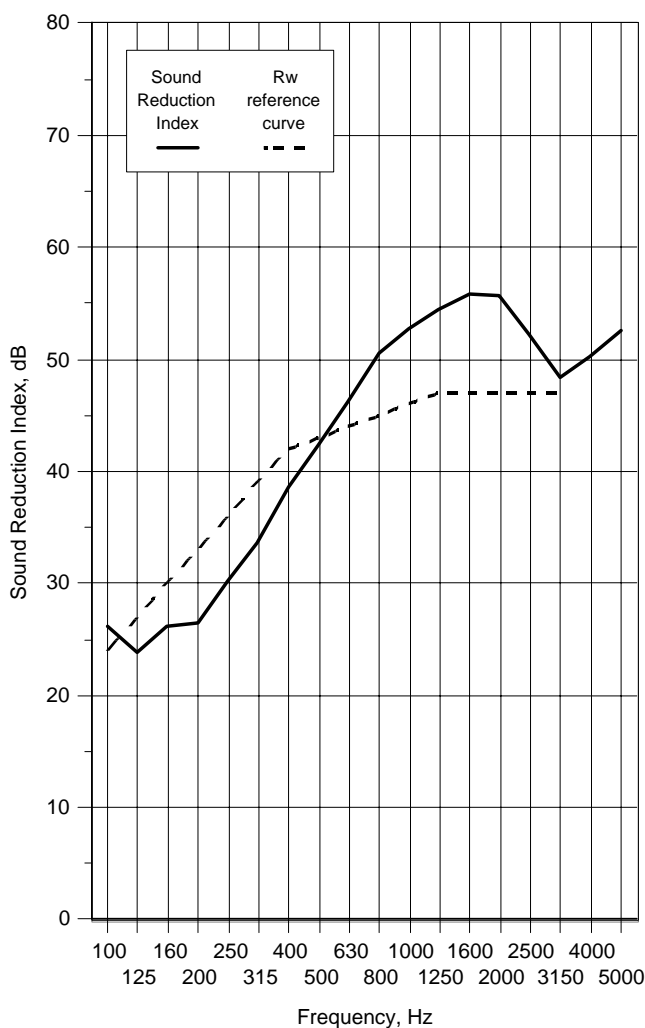
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Data Sheet 5

Test Number : 9
Client: Plasmor Concrete Products
Test Date: 01/05/2007
Sample height: 2.925 m
Sample width: 3.845 m
Product Identification: 140mm Aglite block wall with 12.5mm Lafarge Wallboard plasterboard on dabs to both sides.

Air temperature: 13.2 °C
Air humidity: 51 %
Receiving room volume: 50 m3
Source room volume: 55 m3
Sample weight: 195 kg/m2

Freq f Hz	Sound Reduction Index, dB	
	1/3 Oct	1/1 Oct
50+	27.4	26.3
63+	24.1	
80+	28.6	
100	26.2	25.2
125	23.9	
160	26.1	
200	26.5	29.2
250	30.2	
315	33.6	
400	38.6	41.3
500	42.3	
630	46.2	
800	50.5	52.3
1000	52.7	
1250	54.5	
1600	55.8	54.2
2000	55.7	
2500	52.2	
3150	48.4	50.1
4000	50.2	
5000	52.6	
6300+	55.2	56.2
8000+	55.4	
10000+	58.6	
Average 100-3150	41.5	



Rating according to BS EN ISO 717-1:1997

Rw(C;Ctr)= **43 (-2;-6)** dB

Notes * designates measurement corrected for background

designates limit of measurement due to background

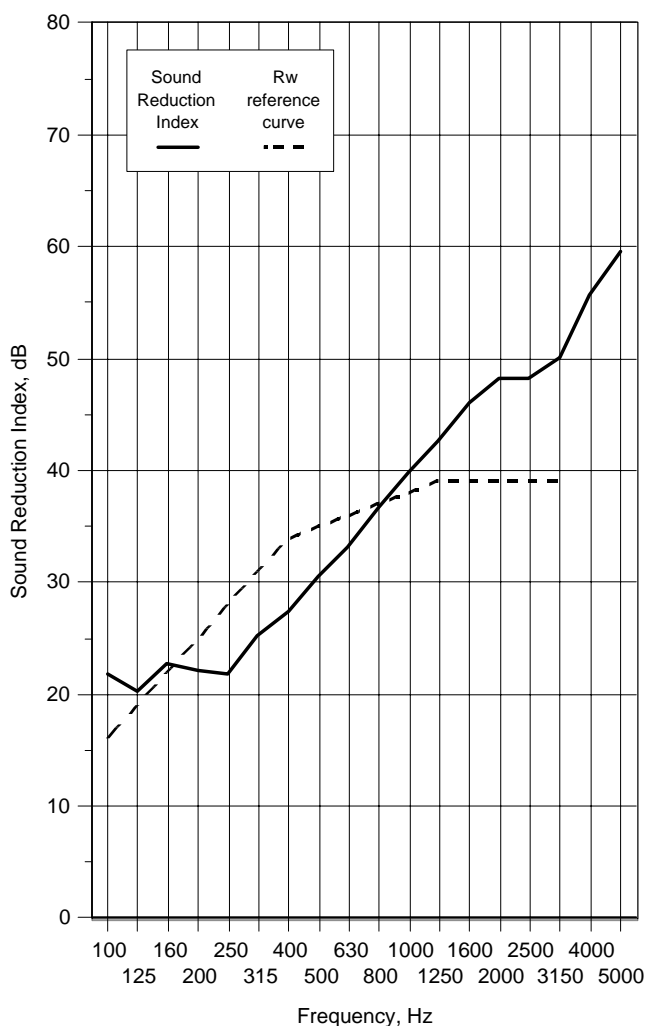
+ designates frequency beyond standard and not UKAS accredited

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Data Sheet 6

Test Number : 10 **Air temperature:** 13.6 °C
Client: Plasmor Concrete Products **Air humidity:** 50 %
Test Date: 01/05/2007 **Receiving room volume** 50 m3
Sample height: 2.925 m **Source room volume:** 55 m3
Sample width: 3.845 m **Sample weight:** 187 kg/m2
Product
Identification: 140mm Aglite block wall with 12.5mm Lafarge
 Wallboard plasterboard on dabs to source side only.

Freq f Hz	Sound Reduction Index, dB	
	1/3 Oct	1/1 Oct
50+	21.8	21.8
63+	20.9	
80+	22.9	
100	21.9	21.5
125	20.3	
160	22.7	
200	22.1	22.8
250	21.8	
315	25.2	
400	27.4	29.8
500	30.6	
630	33.1	
800	36.8	39.1
1000	39.8	
1250	42.7	
1600	46.1	47.4
2000	48.2	
2500	48.2	
3150	50.1	53.4
4000	55.7	
5000	59.5	
6300+	61.8	61.5
8000+	61.2	
10000+	61.7 *	
Average 100-3150	33.6	



Rating according to BS EN ISO 717-1:1997

Rw(C;Ctr)= **35 (-1;-5)** dB

Notes * designates measurement corrected for background

designates limit of measurement due to background

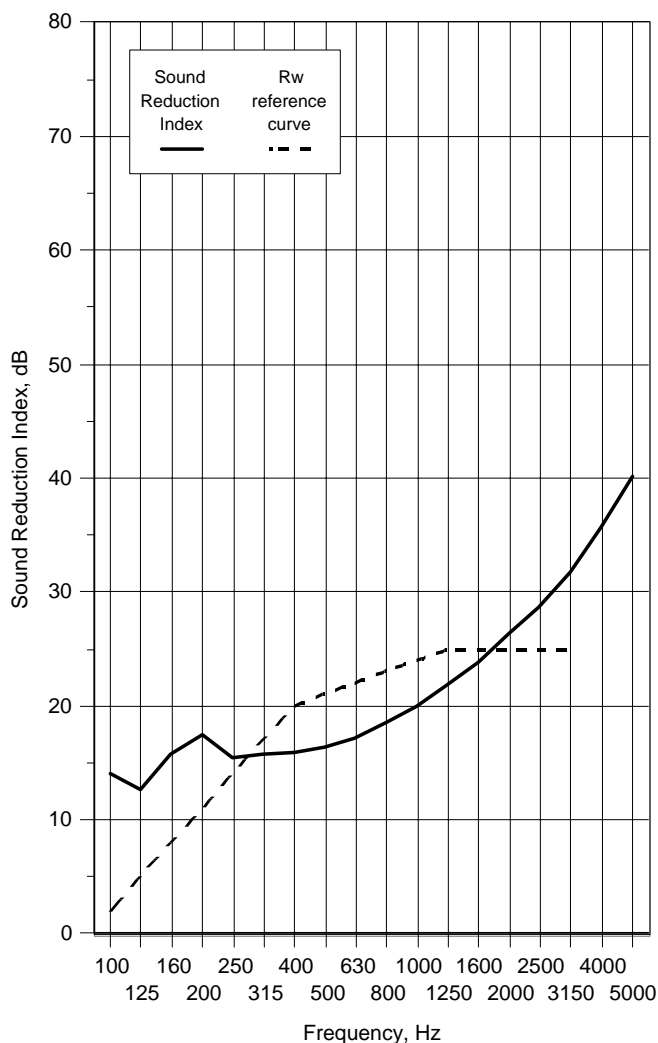
+ designates frequency beyond standard and not UKAS accredited

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Data Sheet 7

Test Number : 11 **Air temperature:** 13.7 °C
Client: Plasmor Concrete Products **Air humidity:** 50 %
Test Date: 01/05/2007 **Receiving room volume** 50 m³
Sample height: 2.925 m **Source room volume:** 55 m³
Sample width: 3.845 m **Sample weight:** 178 kg/m²
Product
Identification: 140mm Aglite block wall, bare faced.

Freq f Hz	Sound Reduction Index, dB	
	1/3 Oct	1/1 Oct
50+	16.5	16.1
63+	18.6	
80+	14.3	
100	14.1	14.0
125	12.7	
160	15.7	
200	17.4	16.1
250	15.4	
315	15.7	
400	15.9	16.4
500	16.4	
630	17.1	
800	18.6	19.9
1000	20.0	
1250	21.8	
1600	23.9	25.9
2000	26.4	
2500	28.7	
3150	31.7	34.6
4000	35.6	
5000	40.1	
6300+	47.0	50.3
8000+	52.3	
10000+	56.4	
Average 100-3150	19.5	



Rating according to BS EN ISO 717-1:1997

Rw(C;Ctr)= **21 (0;-2)** dB

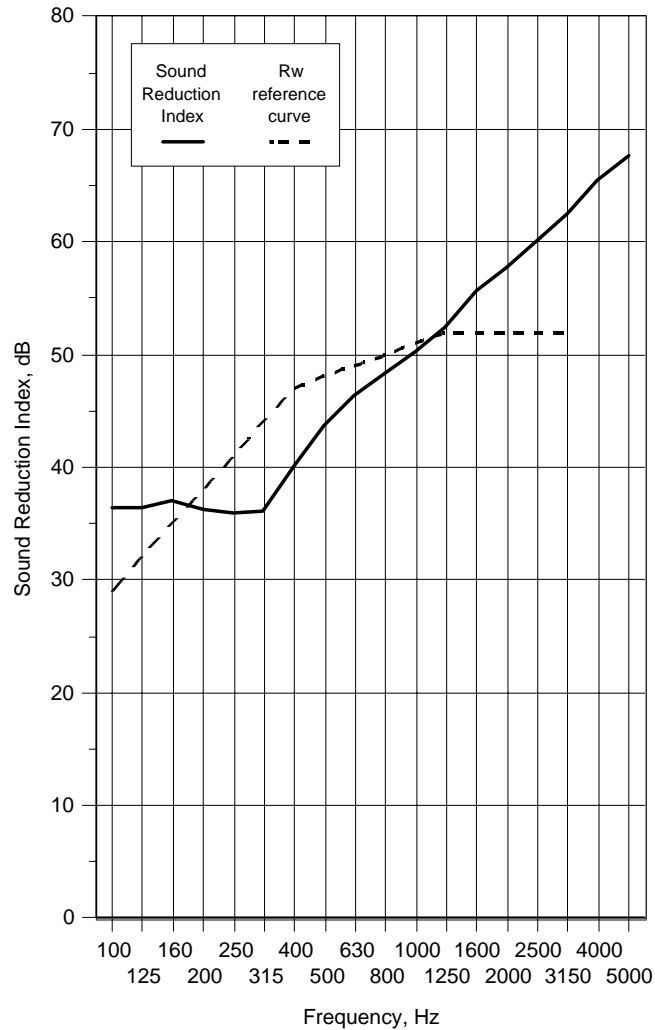
Notes * designates measurement corrected for background
 # designates limit of measurement due to background
 + designates frequency beyond standard and not UKAS accredited

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Data Sheet 8

Test Number : 12 **Air temperature:** 12.2 °C
Client: Plasmor Concrete Products **Air humidity:** 54 %
Test Date: 02/05/2007 **Receiving room volume** 50 m3
Sample height: 2.925 m **Source room volume:** 55 m3
Sample width: 3.845 m **Sample weight:** 182 kg/m2
Product
Identification: 140mm Aglite block wall with 2 coat wet plaster
 (nom. 10mm) to source side only.

Freq f Hz	Sound Reduction Index, dB	
	1/3 Oct	1/1 Oct
50+	24.4	26.9
63+	26.4	
80+	36.5	
100	36.5	36.6
125	36.5	
160	37.0	
200	36.3	36.1
250	35.9	
315	36.1	
400	40.2	42.7
500	43.8	
630	46.4	
800	48.4	50.0
1000	50.2	
1250	52.4	
1600	55.7	57.4
2000	57.7	
2500	60.1	
3150	62.6	64.7
4000	65.5	
5000	67.6	
6300+	68.0	65.0
8000+	63.8	
10000+	64.2	
Average 100-3150	46.0	



Rating according to BS EN ISO 717-1:1997

Rw(C;Ctr)= 48 (-1;-5) dB

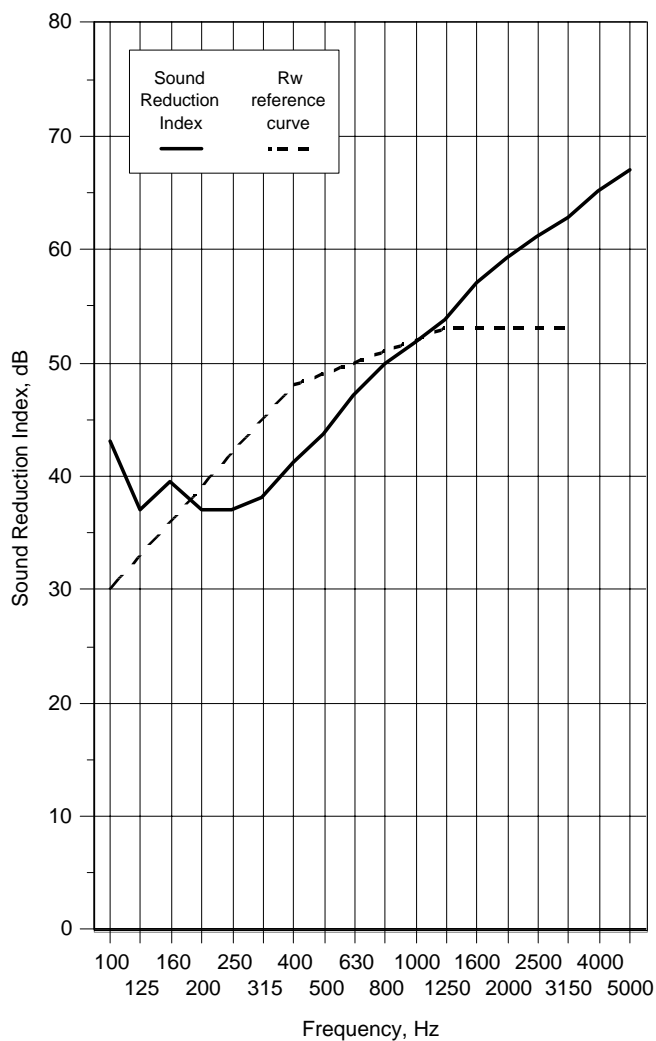
Notes * designates measurement corrected for background
 # designates limit of measurement due to background
 + designates frequency beyond standard and not UKAS accredited

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Data Sheet 9

Test Number : 14 **Air temperature:** 12.4 °C
Client: Plasmor Concrete Products **Air humidity:** 57 %
Test Date: 04/05/2007 **Receiving room volume** 50 m3
Sample height: 2.925 m **Source room volume:** 55 m3
Sample width: 3.845 m **Sample weight:** 187 kg/m2
Product
Identification: 140mm Aglite block wall with 2 coat wet plaster
(nom. 10mm) to both sides.

Freq f Hz	Sound Reduction Index, dB	
	1/3 Oct	1/1 Oct
50+	37.4	38.8
63+	38.0	
80+	42.6	
100	43.1	39.2
125	37.0	
160	39.5	
200	37.0	37.3
250	37.0	
315	38.1	
400	41.2	43.4
500	43.7	
630	47.2	
800	50.0	51.6
1000	51.8	
1250	53.9	
1600	57.1	58.9
2000	59.3	
2500	61.2	
3150	62.9	64.7
4000	65.1	
5000	67.1	
6300+	64.4	62.7
8000+	61.1	
10000+	63.4 *	
Average 100-3150	47.5	



Rating according to BS EN ISO 717-1:1997

Rw(C;Ctr)= **49 (-1;-4)** dB

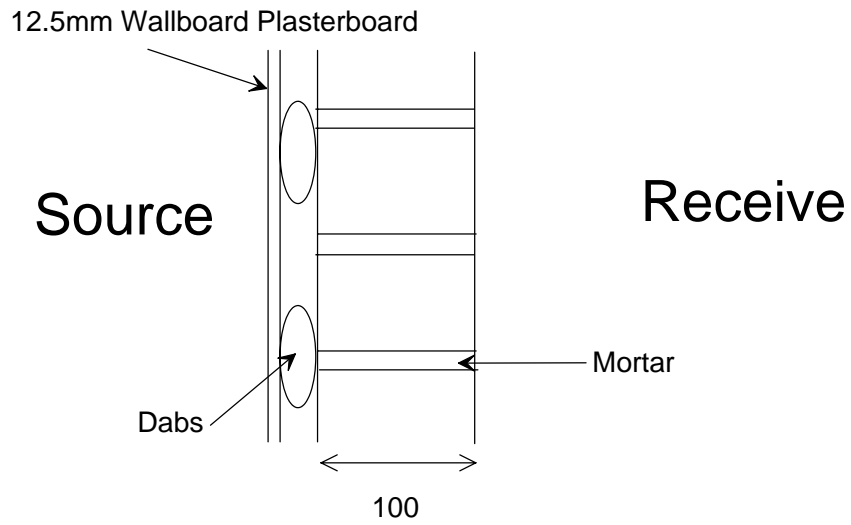
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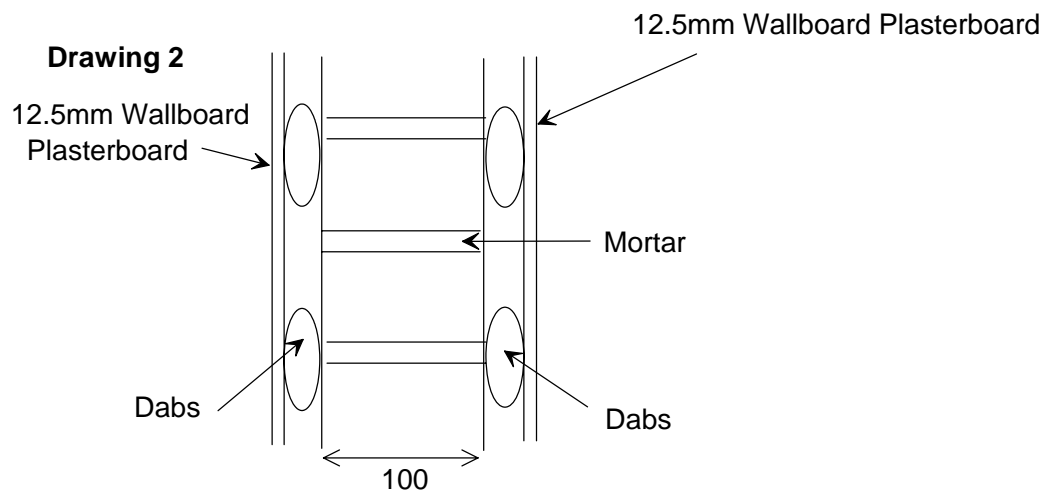
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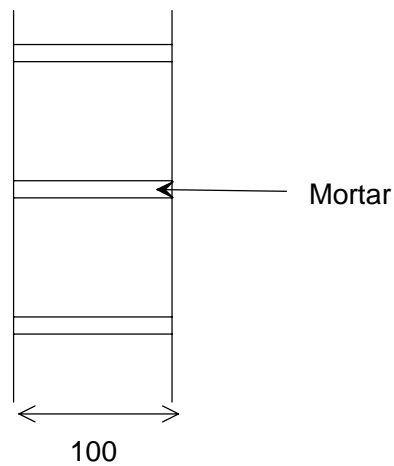
Drawing 1



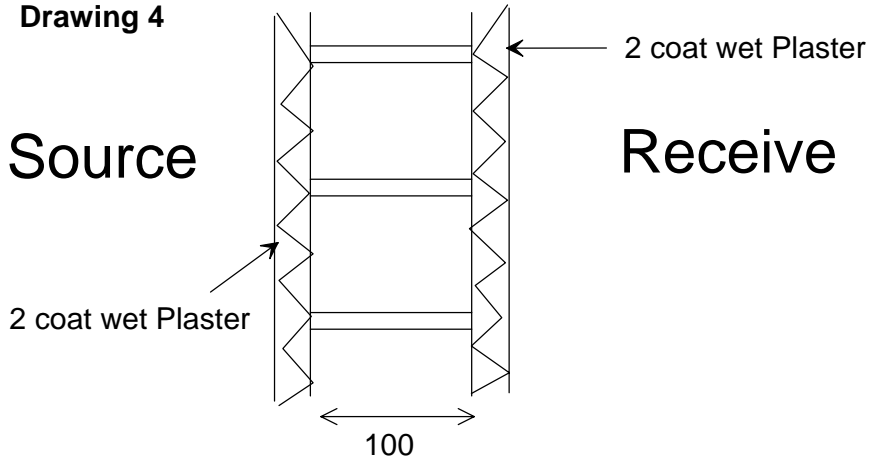
Drawing 2



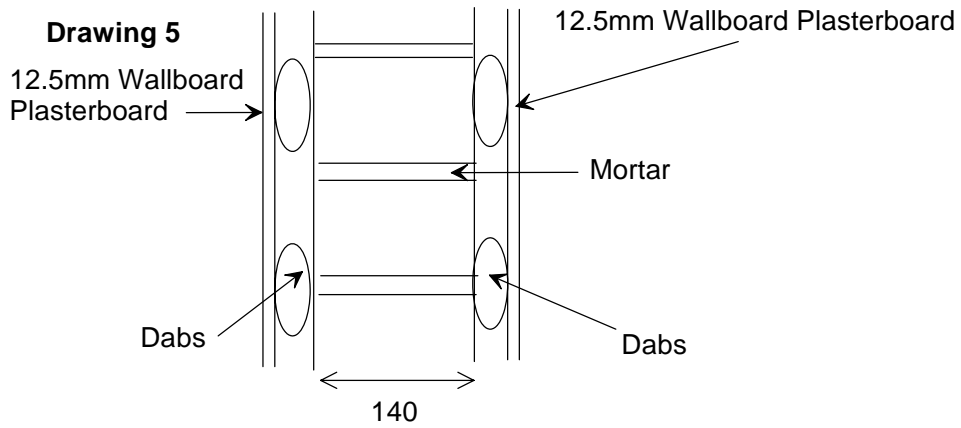
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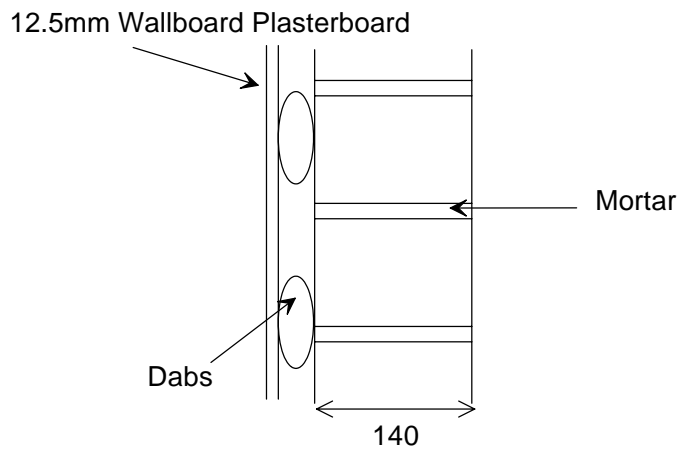
Drawing 4



Drawing 5



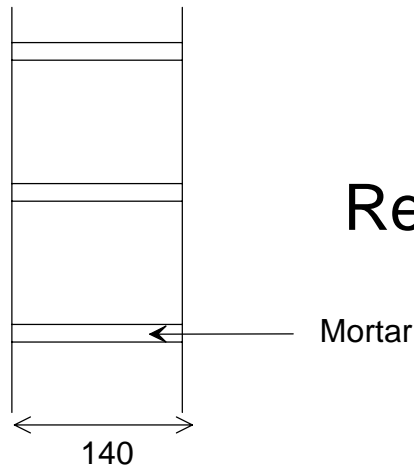
Drawing 6



Drawing 7

Source

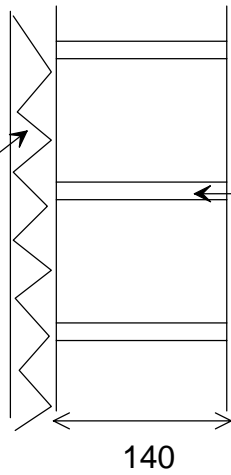
Receive



Drawing 8

2 coat wet Plaster

Mortar

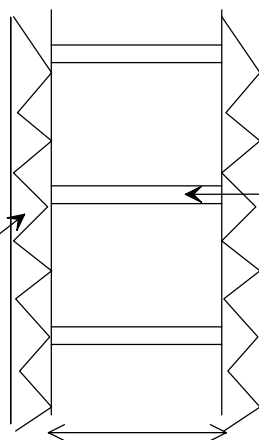


Drawing 9

2 Coat Wet Plaster

2 Coat Wet Plaster

Mortar



Appendix 1

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

The Laboratory determination of airborne sound transmission is characterised by the corrected difference in sound pressure levels measured across the test sample installed between two reverberant rooms. The test is intended to be conducted under conditions which restrict the transmission of sound by paths other than that directly through the sample and where the source 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 or acoustically "live" rooms, both of which are constructed from 215mm brick with reinforced concrete floors and roofs. The brick wall has dimensions of 3.9m wide x 2.9m high and forms the whole of the common area between the two rooms.

One of the rooms termed the source room has a volume of 55 cubic metres and is isolated by the use of resilient mountings and seals, from the surrounding structure and the adjoining room. The adjoining receiving room has a volume of 50 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, filtered into one third octave band widths, integrated and averaged by means of a Real Time Analyser using a microphone on an oscillating microphone boom. The value obtained at any particular frequency is known as the equivalent sound pressure level for either source or receiving rooms. The change in level across the test sample is termed the equivalent sound pressure level difference, i.e.

where $D = L_1 - L_2$

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 a sample is installed on site and forms part of an enclosure of building, the sound insulation obtained will be dependent upon its surface area, the larger the area the greater the sound energy transmitted, as well as the absorption in the receiving area. In addition, the overall sound insulation of an enclosure is also determined by the sound transmission through other building elements, some of which may have an inferior performance to the sample. Because of this the potential Sound Reduction Index of a sample is not always fully realised in practice. A further consequence is that the Sound Reduction Index of a particular sample can only successfully be measured in a laboratory because only under such controlled conditions can the sound transmission path be limited to the sample under test.

R_w has been calculated in accordance with the relevant section of BS EN ISO 717-1 from the results of laboratory tests carried out in accordance with BS EN ISO 140-3 : 1995.

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