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Technical Report

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Project

The Laboratory Determination of The Airborne Sound Transmission of an Access Panel

Prepared for

Fire Proofing Services Ltd
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By

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UKAS TESTING
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 an access panel in accordance with BS EN ISO 140-3:1995, BS 2750:Part 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.

R Calvert .

Richard Calvert
Laboratory Engineer

Trevor Hickman
Executive Consultant

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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

4/11/02

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
Olivetti	Computer	M290S
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 BS 2750:Part 3:1995	Laboratory measurement of airborne sound insulation of building elements
BS EN ISO 717-1:1997	Method for rating the airborne sound insulation in buildings and of building elements

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3.0 Description of Test

3.1 Description of Sample

See Drawings 1 and 2 for panel details.

The panel frame was screwed to brickwork, and sealed to the brickwork on both sides with flexible mastic. A 50mm wide, 12.5mm thick plasterboard architrave was fitted on the source room side.

Photographs 1 to 3 show sample installed.

Panel weight 147kg (70kg/m^2).

Test 2: Access panel installed as supplied (Tack welded frame).

Test 3: Panel frame fully sealed to simulate full welds.

Details supplied by Fire Proofing Services Ltd

Sample installed by Fire Proofing Services Ltd

3.2 Sample Delivery date

4/11/02

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.

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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 number	Description	R_w (dB)
2	Panel as supplied	42
3	Panel sealed	46

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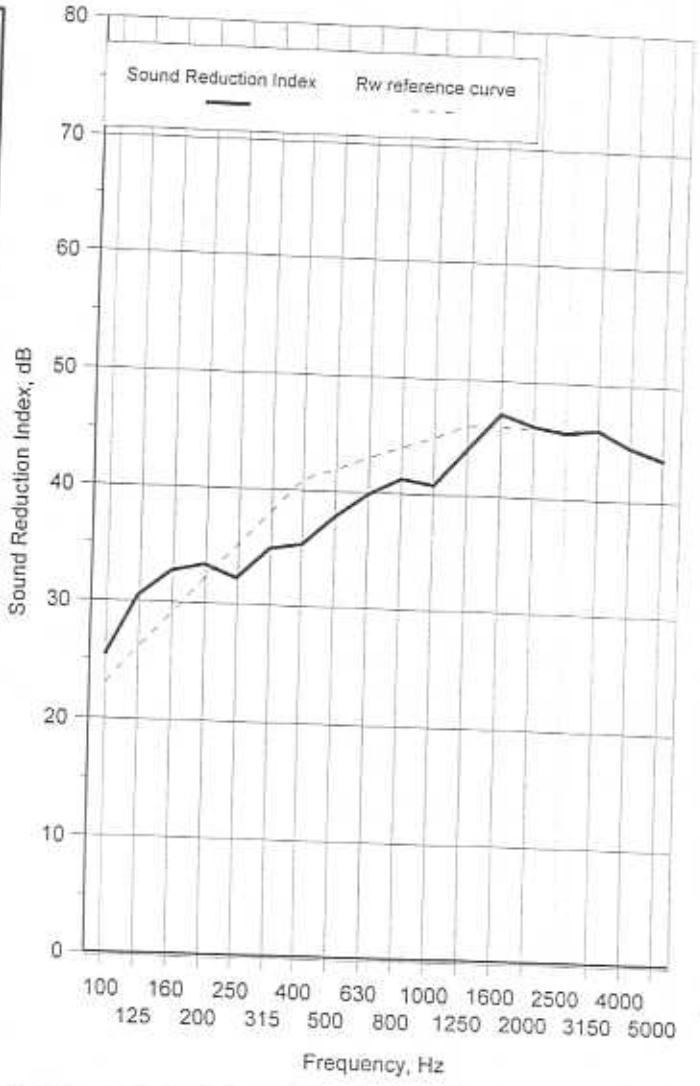
Data Sheet 1

Test Number :	2	Air temperature:	13.1 °C
Manufacturer:	Fire Proofing Services	Air humidity:	73 %
Client:	Fire Proofing Services	Receiving room volume:	50 m3
Test specimen mounted by:	Fire Proofing Services	Source room volume:	55 m3
Test Date:	04/11/02	Sample weight:	70 kg/m2
Product identification:	Access Panel (Tack welded frame)		
Sample height:	2.31 m	Sample width:	0.91 m

Freq f Hz	Sound Reduction Index, dB 1/3 Oct	1/1 Oct
50+	*27.0*	*27.4*
63+	*27.8*	
80+	*27.4*	
100	25.5	28.5
125	30.5	
160	32.6	
200	33.3	33.3
250	32.2	
315	34.9	
400	35.4	37.3
500	37.9	
630	39.9	
800	41.4	41.9
1000	40.8	
1250	44.0	
1600	47.2	46.3
2000	46.2	
2500	45.7	
3150	46.1	44.7
4000	44.6	
5000	43.8	
6300+	*47.1*	*48.2*
8000+	*47.8*	
10000+	*50.6*	
Average 100-3150	38.4	



Rating according to BS EN ISO 717-1:1997

Rw(C;Ctr) = 42 (-1;-4) dB

Notes *designates measurement corrected for background

designates limit of measurement due to background

+designates frequency beyond standard and not UKAS accredited

v1.3

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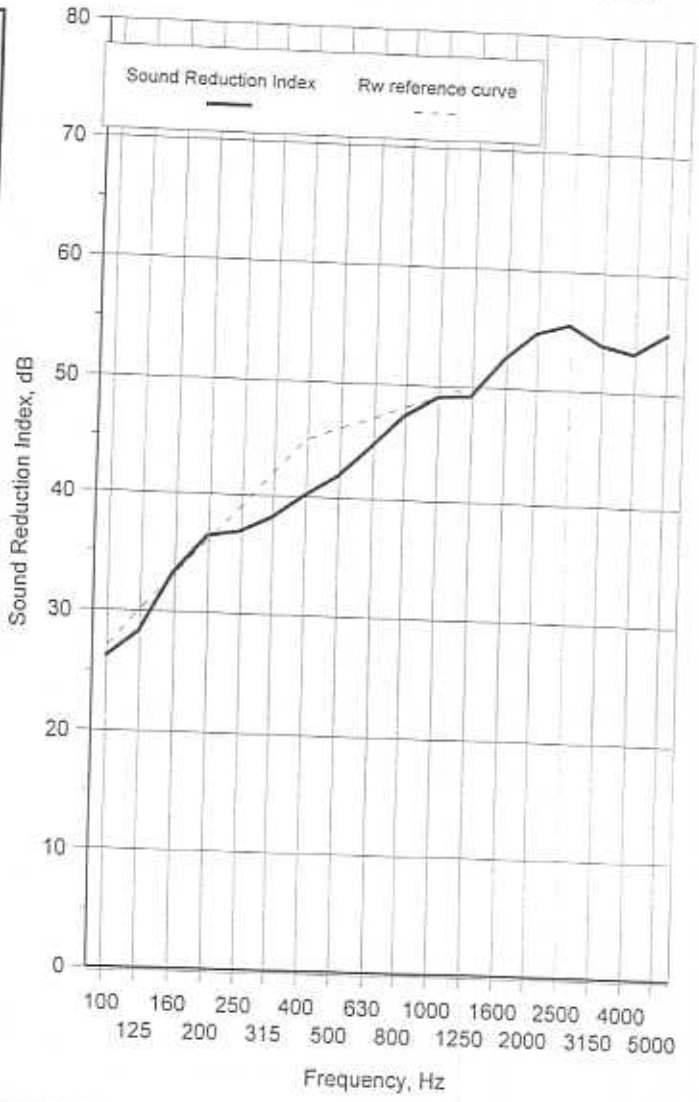
Data Sheet 2

Test Number :	3	Air temperature:	13.1 ℃
Manufacturer:	Fire Proofing Services	Air humidity:	73 %
Client:	Fire Proofing Services	Receiving room volume:	50 m3
Test specimen mounted by:	Fire Proofing Services	Source room volume:	55 m3
Test Date:	04/11/02	Sample weight:	70 kg/m2
Product identification:	Access Panel, Full welds simulated with mastic		
Sample height:	2.31 m	Sample width:	0.91 m

Freq f Hz	Sound Reduction Index, dB 1/3 Oct	1/1 Oct
50+	*27.6*	*25.9*
63+	*24.6*	
80+	*25.9*	
100	26.2	28.4
125	28.3	
160	33.4	
200	36.4	37.1
250	36.9	
315	38.2	
400	40.2	41.9
500	42.0	
630	44.7	
800	47.4	48.4
1000	48.9	
1250	49.2	
1600	52.4	54.0
2000	54.6	
2500	55.4	
3150	53.8	54.0
4000	53.3	
5000	55.0	
6300+	*58.7*	*59.6*
8000+	*59.4*	
10000+	*60.9*	
Average 100-3150	43.0	



Rating according to BS EN ISO 717-1:1997

Rw(C;Ctr) = 46 (-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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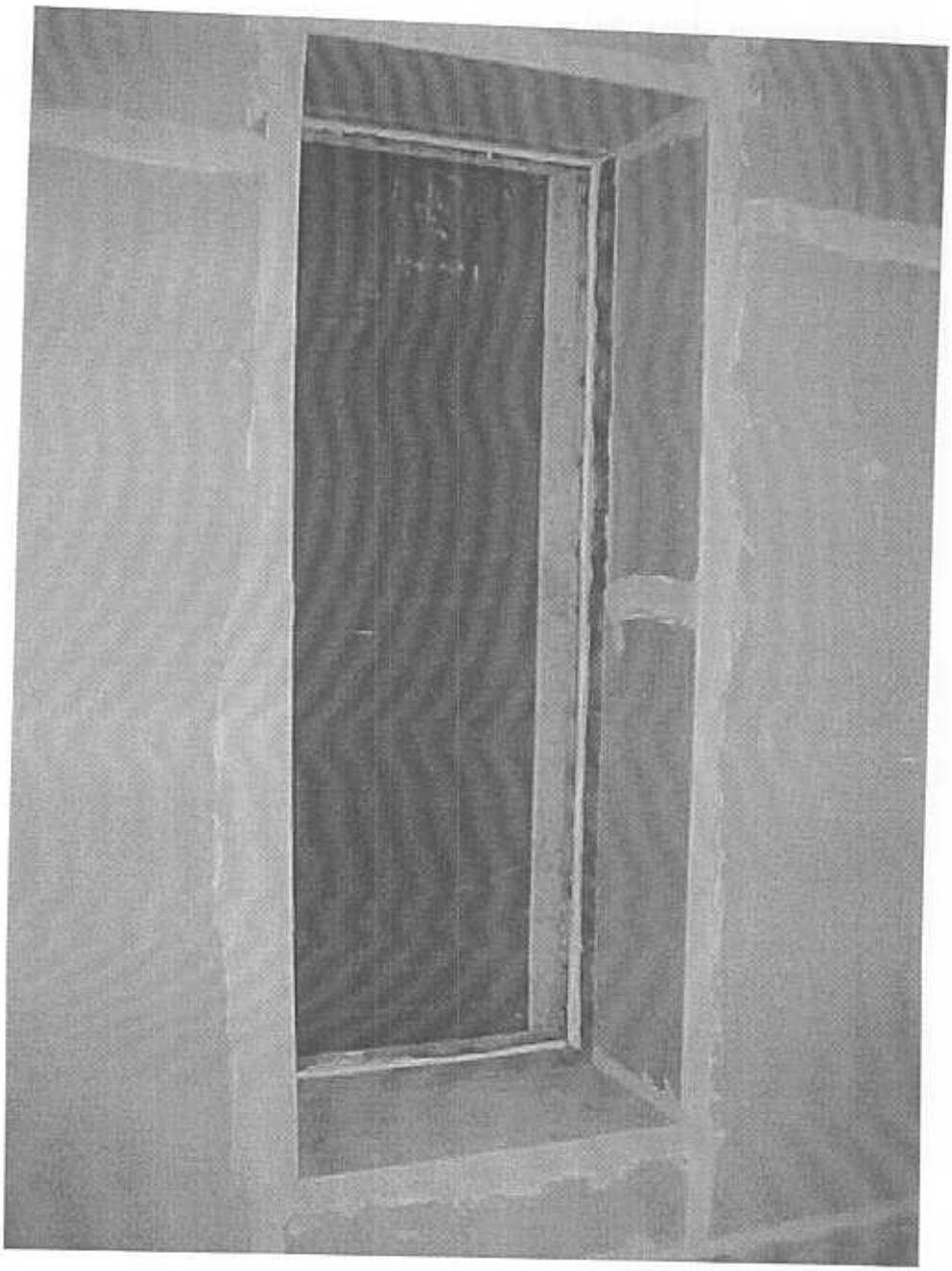
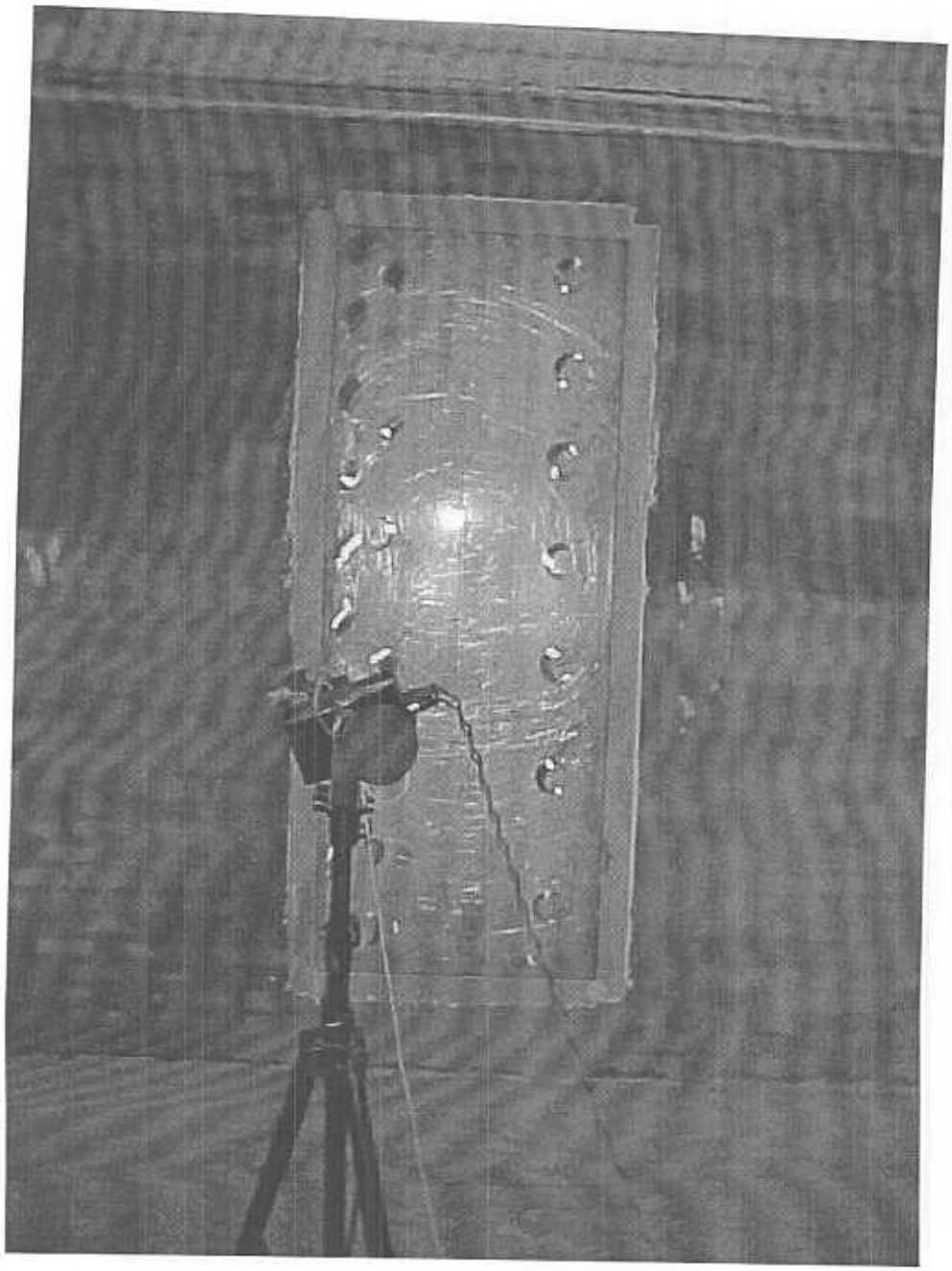
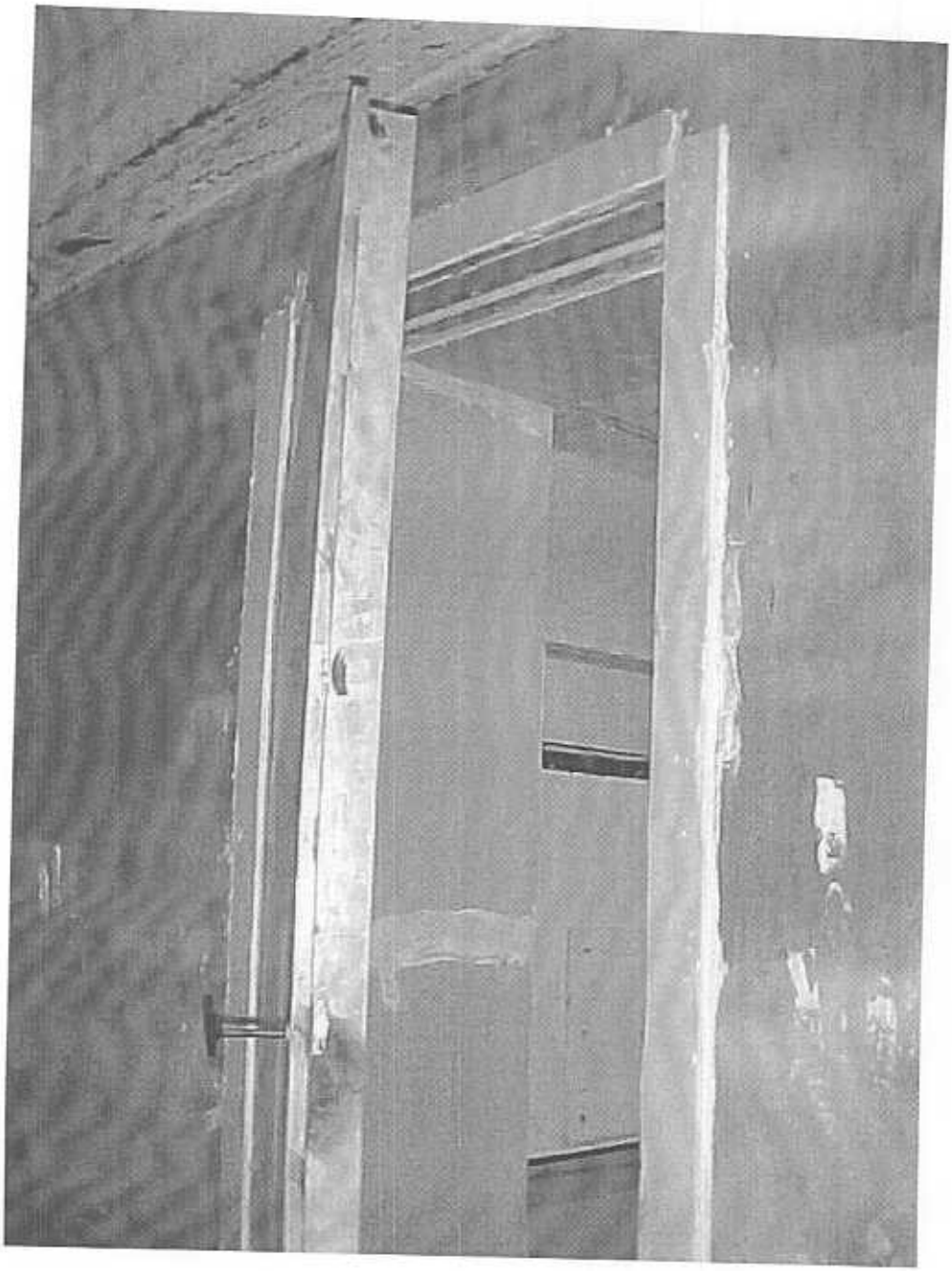
Photograph 1



Photograph 2



Photograph 3



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

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 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.

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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