



Technical Report

Ref Number *C/23010/T01*

Date *13 April 2015*

Project

**The Laboratory Measurement of
Airborne and Impact Sound Insulation
of Floating Floor Treatments on Robust
Details Concrete Base Floor**

Prepared for

**V A Hutchinson Flooring Ltd
Units 1, 2 & 3 Building NA
Beeding Close
Southern Cross Trading Estate
Bognor Regis
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By

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riba
product
selector



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 insulation in accordance with BS EN ISO 10140-2:2010 and impact sound insulation in accordance with BS EN ISO 10140-3:2010.

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

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

**Richard Calvert**

Tester

For and on behalf of

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2.0 Details of Measurements

2.1 Location

Sound Research Laboratories
Holbrook House
Little Waldingfield
Sudbury
Suffolk
CO10 OTF

2.2 Test Date

23 and 24 March 2015

2.3 Tester

Richard Calvert of SRL Technical Services Limited

2.4 Personnel Present

Peter Scott-Darling	Hutchison Flooring
Vic Hutchison	Hutchison Flooring

2.5 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	2639,2669C
	Microphone Calibrator	4231
	Omnipower Sound Source	4296
Larson Davis	12mm Condenser Microphone	2560

Celestion	Loudspeakers	100w
Douglas Curtis	Rotating Microphone Boom	
Oregon Scientific	Temperature & Humidity & Probe	THGR810
TOA	Graphic Equalizer	E-1231
QSC Audio	Power Amplifier	RMX 1450

2.6 References

BS EN ISO 717-1:2013	Rating of sound insulation in buildings and of building elements. Airborne Sound Insulation.
BS EN ISO 717-2:2013	Rating of sound insulation in buildings and of building elements. Impact Sound Insulation
BS EN ISO 10140-2:2010	Laboratory measurement of sound insulation for building element – Part 2: Measurement of airborne sound insulation.
BS EN ISO 10140-3:2010	Laboratory measurement of sound insulation of building elements – Part 3: Measurement of impact sound insulation.

3.0 Description of Test

3.1 Description of Sample

Robust Details Base Floor 150mm thick hollow core concrete planks 300kg/m²
(Edition 3, April 2007)

3 different floating floor treatment were then fitted on top of the base floor constructed from the materials listed below.

See Photographs 1 to 4 and Drawings 1 & 2 for details.

18mm T&G WISA spruce plywood – 7.8 kg/m²
36mm Softwood battens
46mm Softwood battens
New Era Strata Cradle 16/30mm
New Era Strata Cradle Dual system
1000 gauge polythene DPM
50mm Earthwool Acoustic Roll insulation – 0.5 kg/m²
10mm perimeter flanking strip

Sampling plan: Materials taken from top of piles.

Sample condition: New

Details supplied by: Hutchison Flooring

Sample installed by: Hutchison Flooring

3.2 Sample Delivery date

23 March 2015

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 and 3. The measurement uncertainty is given in Appendix 2 and 4.

4.0 Results

The results of the measurements and subsequent analysis are given in Data Sheets 1 to 8 and summarised below.

Results relate only to the items tested.

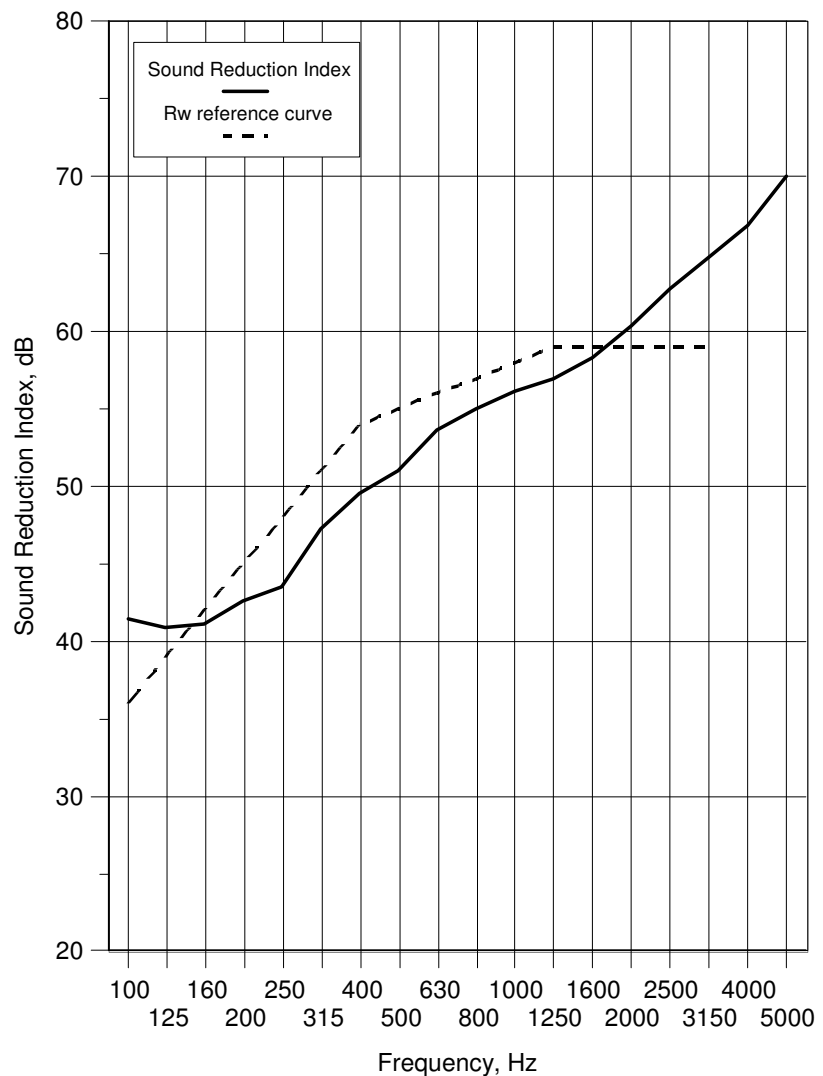
SRL Test No.	Description in Brief	$R_w(C;C_{tr})$ dB	$L_{n,w}$ dB	$rd\Delta L_w$
2 and 3	Base Floor	55 (-1 ; -5)	76	na
3 and 5	18mm T&G WISA spruce plywood 36mm Softwood battens New Era Strata Cradle 16/30mm 50mm Earthwool Acoustic Roll insulation between battens 1000 gauge polythene DPM 10mm perimeter flanking strip Cradles 450mm centres, Battens 400mm centres	59 (-1 ; -6)	52	24
7 and 8	18mm T&G WISA spruce plywood 46mm Softwood battens New Era Strata Cradle Duel system 50mm Earthwool Acoustic Roll insulation between battens 1000 gauge polythene DPM 10mm perimeter flanking strip Cradles 600mm centres, Battens 400mm centres	61 (-2 ; -7)	51	25
9 and 10	18mm T&G WISA spruce plywood 46mm Softwood battens New Era Strata Cradle Duel system 1000 gauge polythene DPM 10mm perimeter flanking strip Cradles 600mm centres, Battens 400mm centres	62 (-2 ; -7)	52	24

End of Text

Data Sheet 1

Test Number :	2	Test Room:	Source	Receiving
Client:	VA Hutchinson Flooring Ltd	Air temperature:	14.5 °C	8.5 °C
Test Date:	23/03/2015	Air humidity:	54 %	56 %
Sample height:	4 m	Volume:	50 m3	115 m3
Sample width:	2.7 m			
Sample weight:	300 kg/m2	Air Pressure:	957 mbar	
Product	Bare Floor			
Identification:				

Freq f Hz	Sound Reduction Index, dB	
	1/3 Oct	1/1 Oct
50+	33.7	37.5
63+	43.7	
80+	41.9	
100	41.5	41.2
125	40.9	
160	41.1	
200	42.6	44.1
250	43.5	
315	47.3	
400	49.6	51.1
500	51.0	
630	53.6	
800	55.0	56.0
1000	56.2	
1250	57.0	
1600	58.3	60.1
2000	60.4	
2500	62.7	
3150	64.8	66.7
4000	66.9	
5000	70.0 *	
6300+	70.7 *	65.0
8000+	66.7 *	
10000+	61.8 *	
Average 100-3150	51.6	Version v2.1



Rating according to BS EN ISO 717-1:2013

Rw(C;Ctr)= **55 (-1;-5) dB**

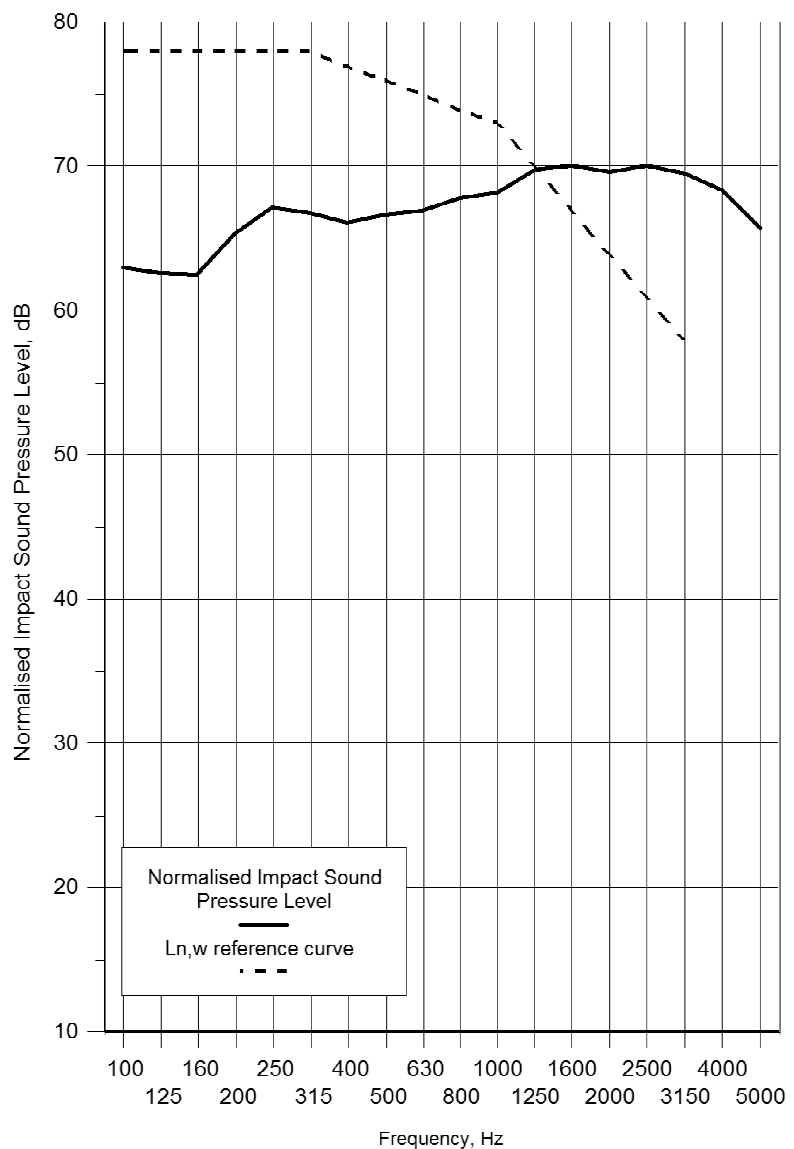
* shows measurement corrected for background

+ shows frequency beyond standard and not UKAS accredited

Data Sheet 2

Test Number: 3 **Air temperature:** 14.4 °C **Sample height:** 4 m
Test Date: 23/03/2015 **Air Pressure:** 957 mbar **Sample width:** 2.7 m
Air humidity: 54 % **Sample weight:** 300 kg/m²
Client: VA Hutchison Flooring Ltd **Measuring room volume:** 115 m³
Product identification: Base Floor

Freq f Hz	Normalised Impact Sound Pressure Levels, dB	
	1/3 Oct	1/1 Oct
50+	59.1	62.0
63+	53.8	
80+	57.3	
100	63.1	67.5
125	62.7	
160	62.5	
200	65.4	71.3
250	67.2	
315	66.8	
400	66.2	71.4
500	66.7	
630	67	
800	67.9	73.5
1000	68.3	
1250	69.8	
1600	70	74.7
2000	69.7	
2500	70	
3150	69.6	73.0
4000	68.4	
5000	65.8	
6300+	61.9	64.0
8000+	58.2	
10000+	54.6	



Rating according to BS EN ISO 717-2:2013

$L_{n,w}$ (CI) = **76 (-12) dB**

* shows measurement corrected for background

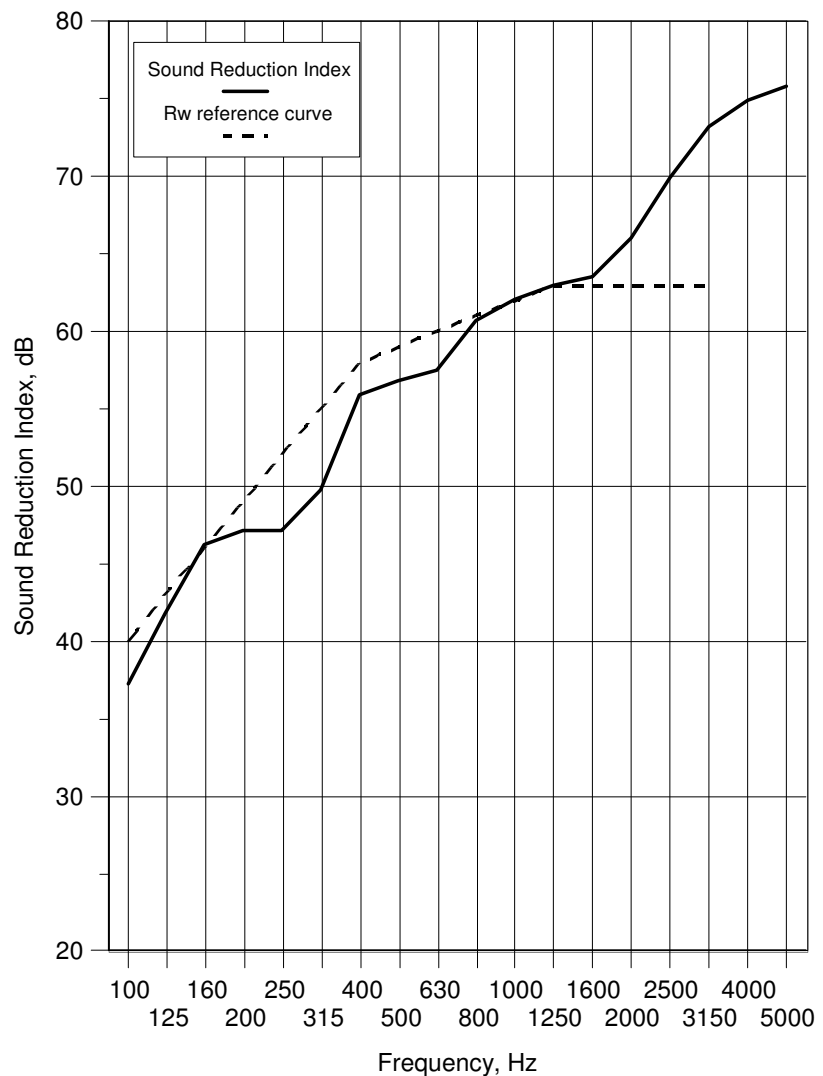
+ shows frequency beyond standard

v3.1

Data Sheet 3

Test Number :	4	Test Room:	Source	Receiving
Client:	VA Hutchinson Flooring Ltd	Air temperature:	15.1 °C	8.7 °C
Test Date:	23/03/2015	Air humidity:	52 %	56 %
Sample height:	4 m	Volume:	50 m3	115 m3
Sample width:	2.7 m			
Sample weight:	308.3 kg/m2	Air Pressure:	957 mbar	
Product	Bare Floor with 18mm plywood, 36mm softwood batten,			
Identification:	New Era Strata Cradle 16/30mm, 1000 gauge DPM 50mm Earthwool acoustic partition roll between battens			

Freq f Hz	Sound Reduction Index, dB	
	1/3 Oct	1/1 Oct
50+	29.9	33.2
63+	37.8	
80+	35.8	
100	37.3	40.3
125	41.8	
160	46.2	
200	47.2	47.8
250	47.1	
315	49.8	
400	55.9	56.7
500	56.8	
630	57.5	
800	60.7	61.8
1000	62.1	
1250	63.0	
1600	63.5	65.8
2000	66.0	
2500	69.9	
3150	73.2 *	74.5
4000	74.9 *	
5000	75.9 *	
6300+	74.6 *	68.0
8000+	69.7 *	
10000+	64.8 *	
Average 100-3150	56.1	Version v2.1



Rating according to BS EN ISO 717-1:2013

Rw(C;Ctr)= **59 (-1;-6) dB**

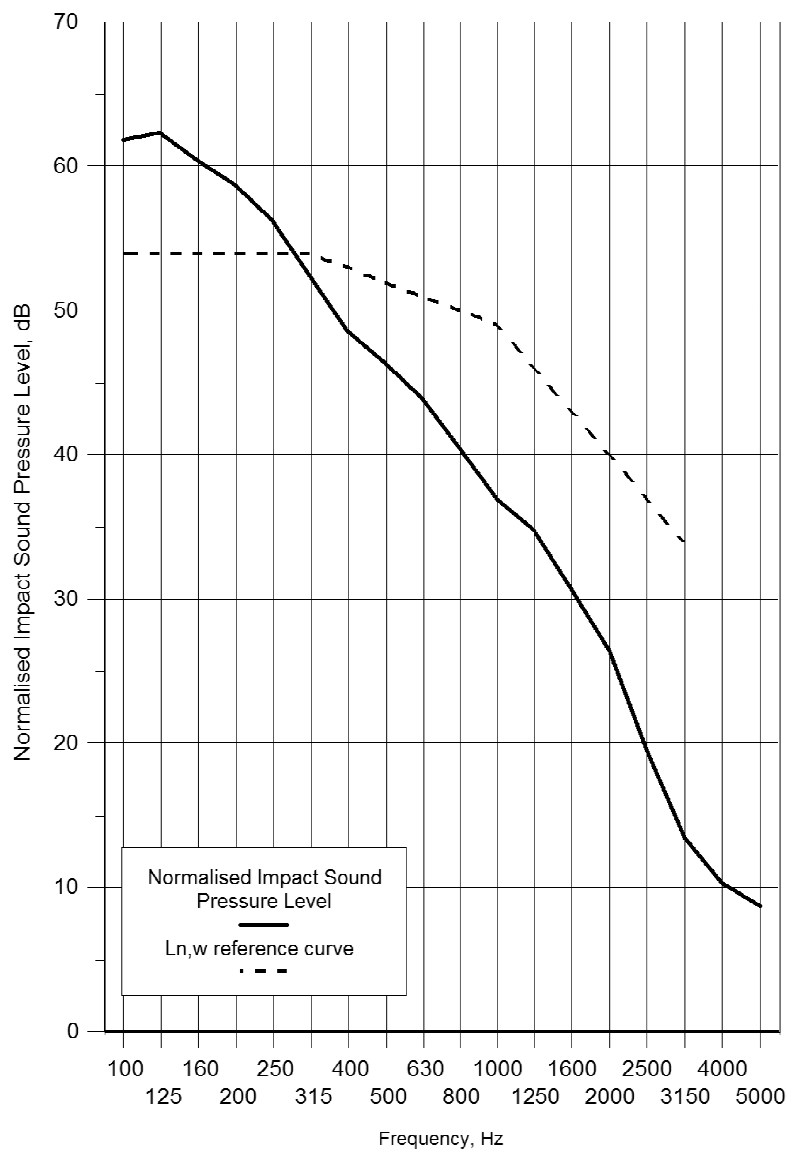
* shows measurement corrected for background

+ shows frequency beyond standard and not UKAS accredited

Data Sheet 4

Test Number: 5 **Air temperature:** 15.1 °C **Sample height:** 4 m
Test Date: 23/03/2015 **Air Pressure:** 957 mbar **Sample width:** 2.7 m
Air humidity: 52 % **Sample weight:** 308.3 kg/m²
Client: VA Hutchison Flooring Ltd **Measuring room volume:** 115 m³
Product identification: Bare Floor with 18mm plywood, 36mm softwood batten,
 New Era Strata Cradle 16/30mm, 1000 gauge DPM
 50mm Earthwool acoustic partition roll between battens

Freq f Hz	Normalised Impact Sound Pressure Levels, dB	
	1/3 Oct	1/1 Oct
50+	59.8	64.2
63+	56.9	
80+	60.8	
100	61.9	66.4
125	62.4	
160	60.5	
200	58.8	61.3
250	56.3	
315	52.4	
400	48.7	51.5
500	46.4	
630	43.9	
800	40.5	42.8
1000	36.9	
1250	34.7	
1600	30.7	32.3
2000	26.4	
2500	19.6 *	
3150	13.5 *	16.1
4000	< 10.3	
5000	< 8.8	
6300+	< 9.7	15.9
8000+	< 11.4	
10000+	< 12.1	



Rating according to BS EN ISO 717-2:2013

$L_{n,w}$ (C1) = **52 (1) dB**

* shows measurement corrected for background

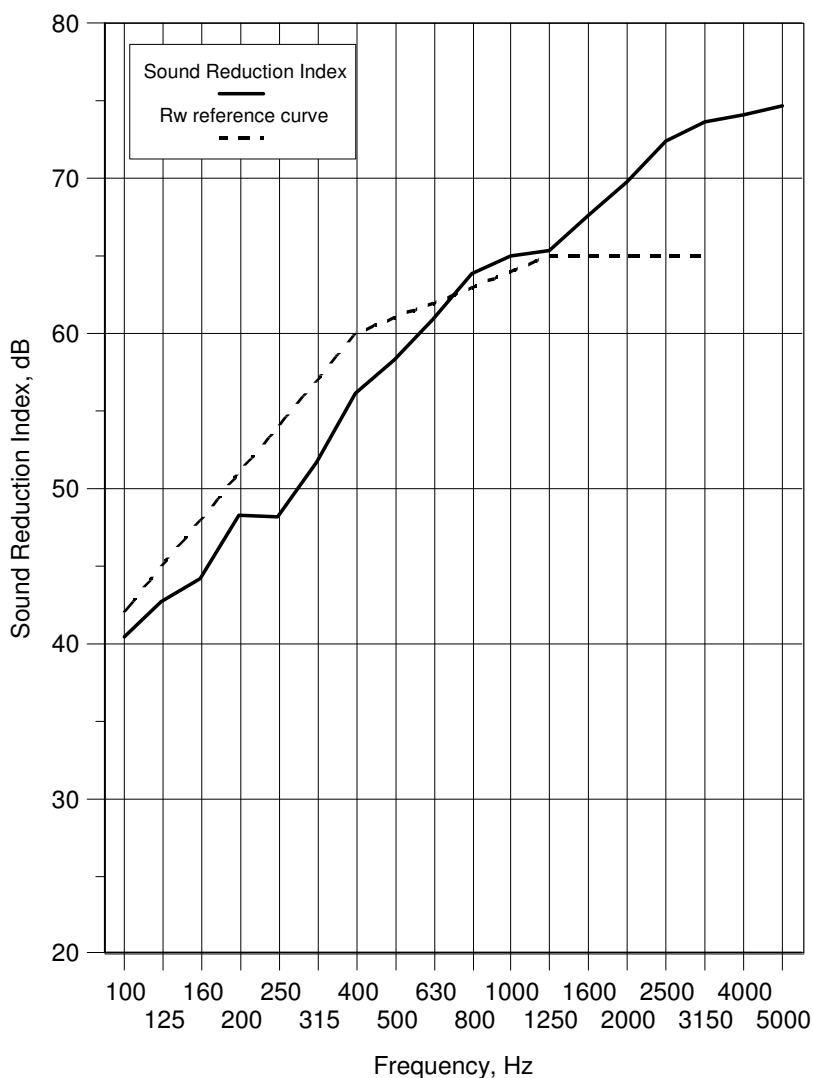
+ shows frequency beyond standard

v3.1

Data Sheet 5

Test Number :	7	Test Room:	Source	Receiving
Client:	VA Hutchinson Flooring Ltd	Air temperature:	14.9 °C	9.3 °C
Test Date:	24/03/2015	Air humidity:	47 %	61 %
Sample height:	4 m	Volume:	50 m3	115 m3
Sample width:	2.7 m			
Sample weight:	308.3 kg/m2	Air Pressure:	951 mbar	
Product	Bare Floor with 18mm plywood, 46mm softwood batten,			
Identification:	New Era Strata Cradle Dual System, 1000 gauge DPM 50mm Earthwool acoustic partition roll between battens			

Freq f Hz	Sound Reduction Index, dB	
	1/3 Oct	1/1 Oct
50+	32.6	35.3
63+	36.5	
80+	39.8	
100	40.4	42.2
125	42.7	
160	44.2	
200	48.3	49.1
250	48.2	
315	51.7	
400	56.2	58.1
500	58.3	
630	60.9	
800	63.9	64.7
1000	65.0	
1250	65.4	
1600	67.7	69.6
2000	69.8	
2500	72.4	
3150	73.7 *	74.1
4000	74.1 *	
5000	74.7 *	
6300+	73.1 *	66.2
8000+	68.4 *	
10000+	62.8 *	
Average 100-3150	58.1	Version v2.1



Rating according to BS EN ISO 717-1:2013

Rw(C;Ctr)= **61 (-2;-7) dB**

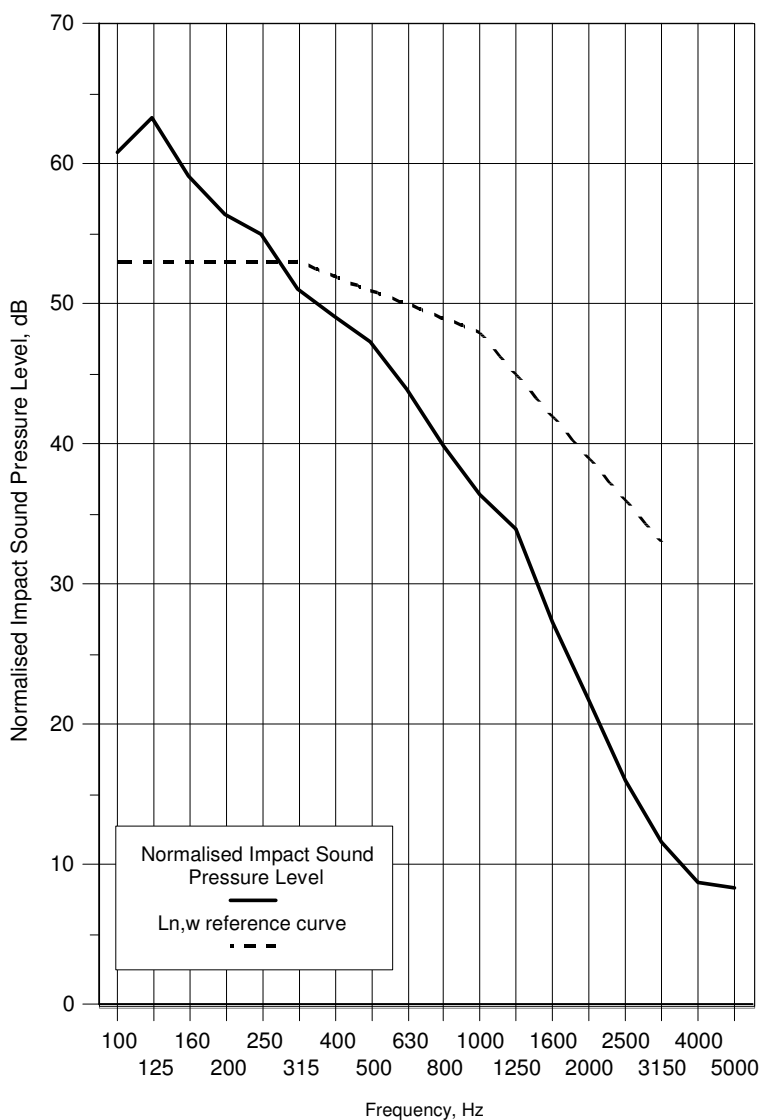
* shows measurement corrected for background

+ shows frequency beyond standard and not UKAS accredited

Data Sheet 6

Test Number: 8
Test Date: 24/03/2015
Client: VA Hutchison Flooring Ltd
Product identification: Bare Floor with 18mm plywood, 46mm softwood batten, New Era Strata Cradle Dual system, 1000 gauge DPM 50mm Earthwool acoustic partition roll between battens
Air temperature: 14.9 °C
Air Pressure: 951 mbar
Air humidity: 47 %
Sample height: 4 m
Sample width: 2.7 m
Sample weight: 308.3 kg/m²
Measuring room volume: 115 m³

Freq f Hz	Normalised Impact Sound Pressure Levels, dB	
	1/3 Oct	1/1 Oct
50+	63.4	65.6
63+	58.2	
80+	58.7	
100	60.8	66.2
125	63.3	
160	59.2	
200	56.4	59.5
250	55	
315	51.1	
400	49.1	52.1
500	47.4	
630	44	
800	39.9	42.2
1000	36.4	
1250	34	
1600	27.3	28.6
2000	21.7	
2500	16.1	
3150	11.6	14.6
4000	< 8.8	
5000	< 8.4	
6300+	< 9.5	15.8
8000+	< 11.1	
10000+	< 12	



Rating according to BS EN ISO 717-2:2013

Ln,w (CI) = 51 (1) dB

* shows measurement corrected for background

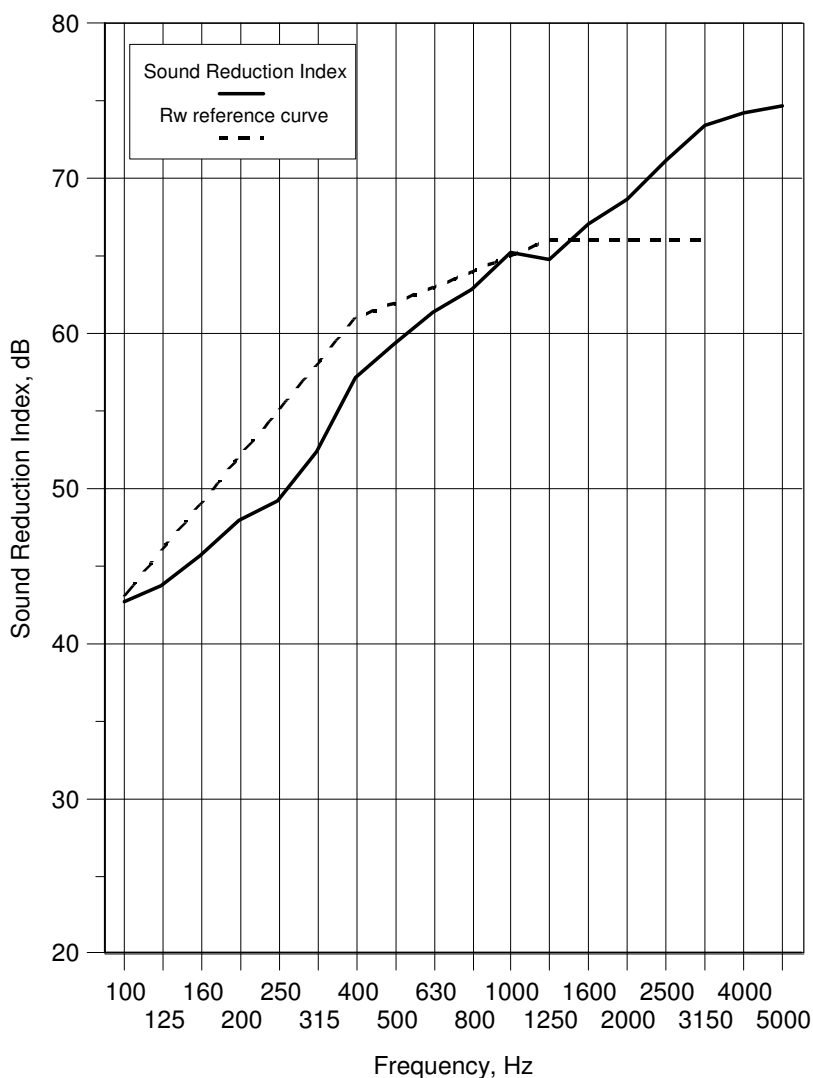
+ shows frequency beyond standard

v3.1

Data Sheet 7

Test Number :	9	Test Room:	Source	Receiving
Client:	VA Hutchinson Flooring Ltd	Air temperature:	15.1 °C	9.3 °C
Test Date:	24/03/2015	Air humidity:	49 %	61 %
Sample height:	4 m	Volume:	50 m3	115 m3
Sample width:	2.7 m			
Sample weight:	307.8 kg/m2	Air Pressure:	951 mbar	
Product	Bare Floor with 18mm plywood, 46mm softwood batten,			
Identification:	New Era Strata Cradle Dual System, 1000 gauge DPM			

Freq f Hz	Sound Reduction Index, dB	
	1/3 Oct	1/1 Oct
50+	31.5	35.1
63+	38.5	
80+	41.1	
100	42.7	43.9
125	43.7	
160	45.7	
200	47.9	49.4
250	49.2	
315	52.4	
400	57.2	59.0
500	59.3	
630	61.4	
800	62.9	64.2
1000	65.3	
1250	64.8	
1600	67.1	68.7
2000	68.7	
2500	71.2	
3150	73.5 *	74.2
4000	74.3 *	
5000	74.7 *	
6300+	73.2 *	66.1
8000+	68.1 *	
10000+	62.8 *	
Average 100-3150	58.3	Version v2.1



Rating according to BS EN ISO 717-1:2013

Rw(C;Ctr)= **62 (-2;-7) dB**

* shows measurement corrected for background

+ shows frequency beyond standard and not UKAS accredited

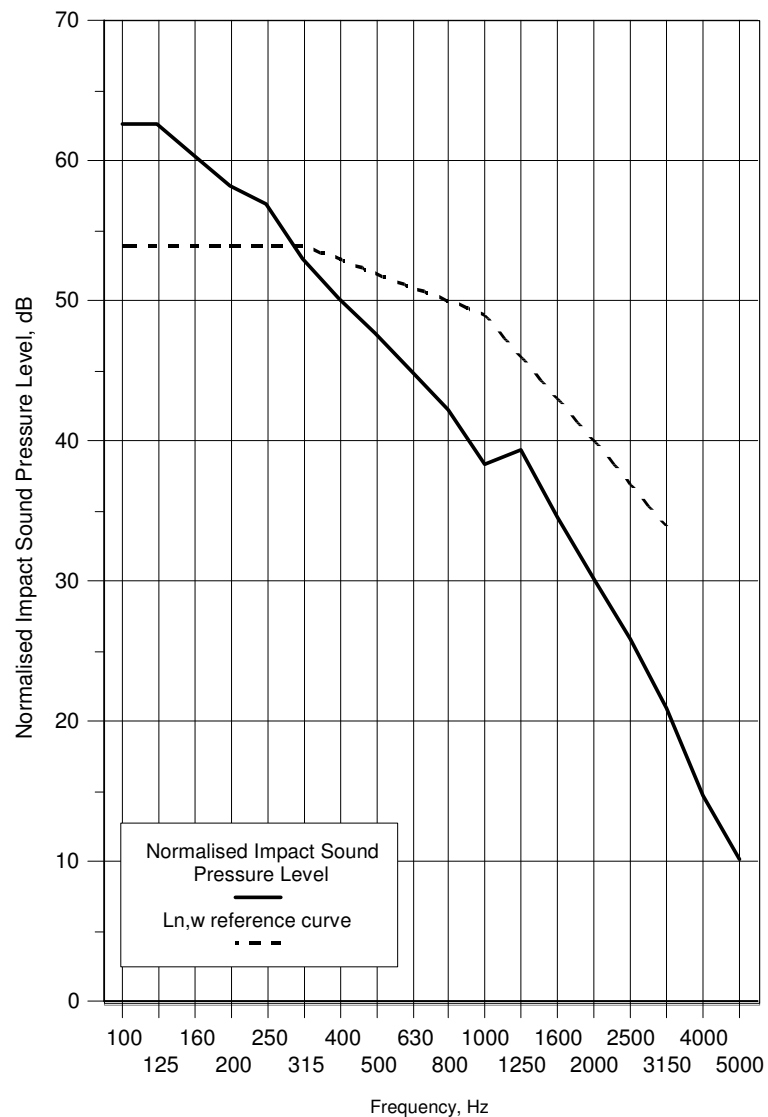
Data Sheet 8

Test Number: 10
Test Date: 24/03/2015
Client: VA Hutchison Flooring Ltd
Product identification: Bare Floor with 18mm plywood, 46mm softwood batten, New Era Strata Cradle Dual system, 1000 gauge DPM

Air temperature: 15.1 °C
Air Pressure: 951 mbar
Air humidity: 49 %
Measuring room volume: 115 m³

Sample height: 4 m
Sample width: 2.7 m
Sample weight: 307.8 kg/m²

Freq f Hz	Normalised Impact Sound Pressure Levels, dB	
	1/3 Oct	1/1 Oct
50+	63.5	65.8
63+	58.4	
80+	59.5	
100	62.6	66.8
125	62.7	
160	60.4	
200	58.3	61.4
250	56.9	
315	53.1	
400	50.2	52.9
500	47.7	
630	45	
800	42.3	45.1
1000	38.4	
1250	39.4	
1600	34.6	36.4
2000	30.2	
2500	25.9	
3150	21	22.2
4000	14.7 *	
5000	< 10.2	
6300+	< 9.8	15.8
8000+	< 11.1	
10000+	< 11.9	



Rating according to BS EN ISO 717-2:2013

Ln,w (CI) = **52 (1) dB**

* shows measurement corrected for background

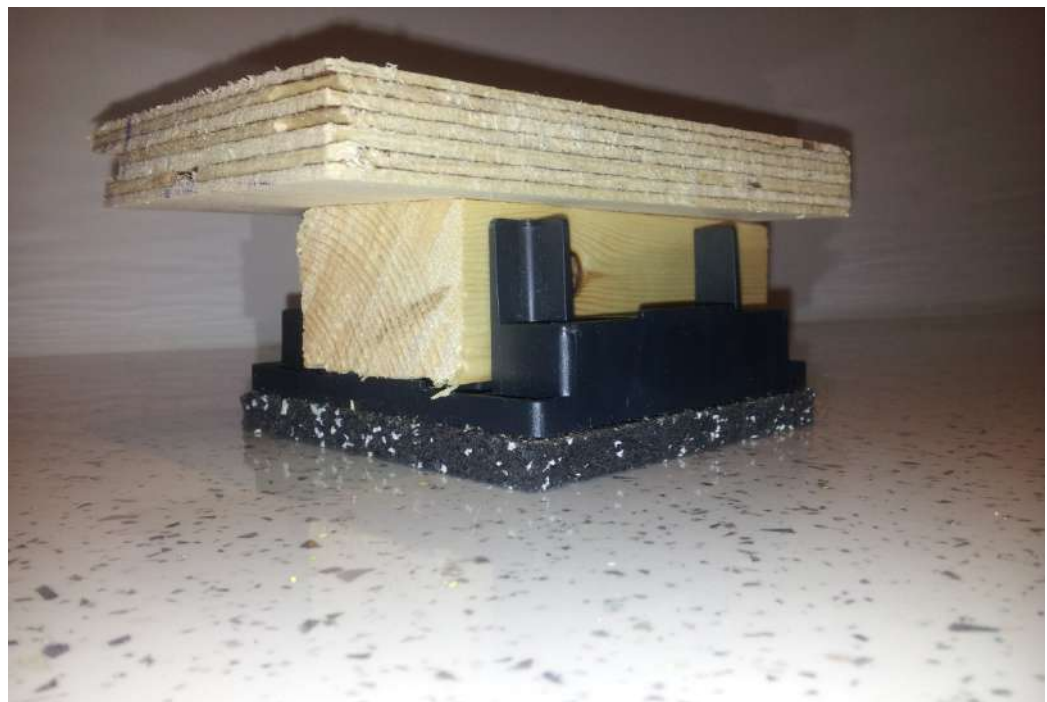
+ shows frequency beyond standard

v3.1

Photograph 1- Tests 4 and 5



Photograph 2- Tests 4 and 5



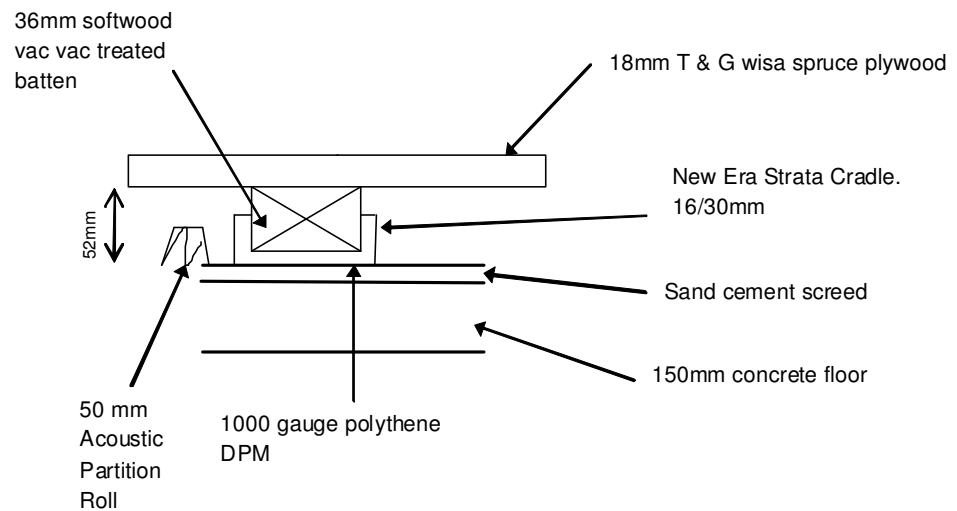
Photograph 3 – Test 7 and 8



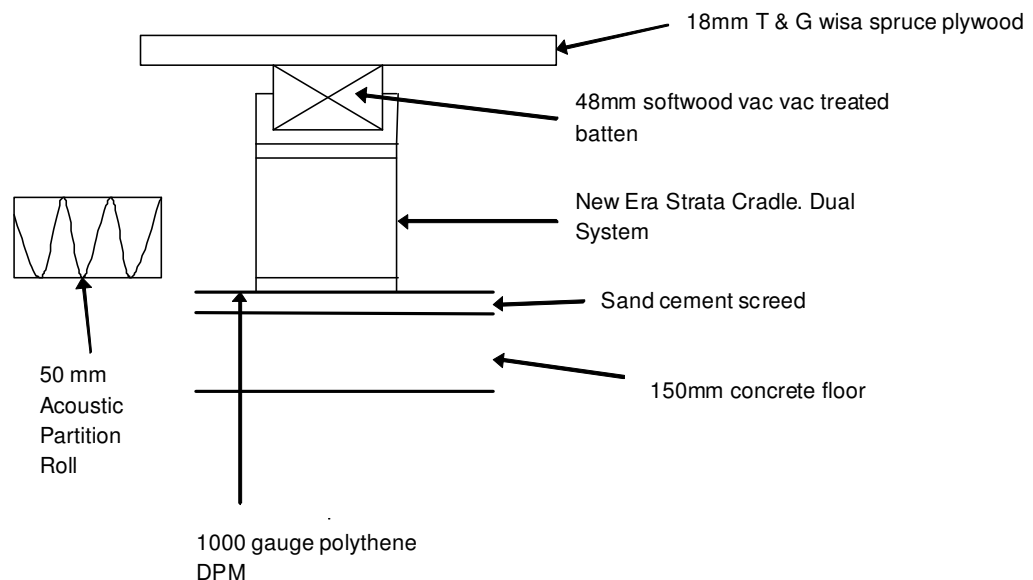
Photograph 4 – Test 7 and 8



Drawing 1



Drawing 2



Appendix 1

Test Procedure

Measurement of Sound Transmission in accordance with BS EN ISO 10140-2: 2010 – TP33

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 constructed in the roof aperture between the two rectangular reverberant (i.e. acoustically "live") rooms, both of which are constructed from 215mm thick brickwork. The floor, which forms the common area between the two rooms, has overall dimensions of 4.85m x 3.9m and contains an aperture 3.98m x 2.7m. The test sample is built and sealed carefully into this aperture.

The upper room, termed the source room, has a volume of 50m³ and is isolated by the surrounding structure by the use of resilient mountings. The lower or receiving room has a volume of 115m³. Reverberation time measurements are done in the receiving room to calibrate it.

Broad band pink noise is produced in the source room from an electronic generator and power amplifier. 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 sound pressure level difference in dB

L₁ is the average sound pressure level in the source room in dB

L₂ is the average sound pressure level in the receiving room in dB

The sound reduction index (R) is also known by the American term “sound transmission loss”. It 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:

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

Where

S is the area of the sample (m²)

A is the total absorption in the receiving room (m²)

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 and method of mounting, but is independent of the overall area of the sample.

However, when an example of this roof 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 of a roof is affected by the sound transmission through other building elements, some of which may have an inferior performance to the sample. In practice, therefore, the potential sound reduction index of a sample is not fully realised on site. Furthermore, the sound reduction index of a particular sample floor 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_w, C and C_{tr} have been calculated in accordance with the relevant section of BS EN ISO 717-1:1997 from the results of laboratory tests carried out in accordance with BS EN ISO 10140-2:2010.

Appendix 2

Measurement Uncertainty BS EN ISO 10140-2: 2010 – TP33

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	3.2
125	2.9
160	2.5
200	2.5
250	1.8
315	1.8
400	1.5
500	1.5
630	1.2
800	1.2
1000	1.2
1250	1.2
1600	1.2
2000	1.2
2500	1.2
3150	1.2

Appendix 3

Test Procedure

Measurement of Impact Sound Transmission in accordance with BS EN ISO 10140-3: 2010 – TP31

In the laboratory, impact sound transmission is determined from the sound pressure levels generated by a standard impact machine operating on the test sample installed above a reverberant room. The sound pressure levels are measured in that room. The test is done under conditions which restrict the transmission of sound other than directly through the sample.

The test sample is constructed in the floor aperture between the two rectangular reverberant (i.e. acoustically "live") rooms, both of which are constructed from 215mm thick brickwork. The floor, which forms the common area between the two rooms, has overall dimensions of 4.85m x 3.9m and contains an aperture 3.98m x 2.7m. The test sample is built and sealed carefully into the aperture.

The upper room, termed the source room, has a volume of 50m³ and is isolated by the surrounding structure by the use of resilient mountings. The lower or receiving room has a volume of 115m³. Reverberation time measurements are done in the receiving room to calibrate it.

The impact machine is a standard tapping machine which is placed on top of the test sample at the first of a number of positions.

With the tapping machine operating on the test sample the resulting sound pressure levels in the room 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 bandwidths, integrated and averaged. The value obtained at any particular frequency is known as the impact sound pressure level (L_i). This is corrected to a reference room absorption, referred to as normalising, to give the normalised impact sound pressure level (L_n).

$$L_n = L_i + 10 \log \frac{A}{A_{ref}} \text{ in decibels}$$

where

A is the actual absorption of the test chamber in m²
 A_{ref} is the reference room absorption of 10m²

The procedure is then repeated for at least three other impact source positions. The individual values for the different positions are arithmetically averaged to provide a final result for the normalised impact sound pressure level at each frequency.

$L_{n,w}$ and C_i have been calculated in accordance with the relevant section of BS EN ISO 717-2:1997 from the results of laboratory tests carried out in accordance with BS EN ISO 10140-3:2010.

Appendix 4

Measurement Uncertainty BS EN ISO 10140-3: 2010 – TP31

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	2.2
125	1.8
160	1.5
200	1.5
250	1.5
315	1.5
400	1.5
500	1.2
630	1.2
800	1.2
1000	1.2
1250	1.2
1600	1.2
2000	1.2
2500	1.2
3150	1.2

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Laboratory and Site Testing
Fire
BREEAM
Air Tightness
Air Quality

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

Member of the Association of Noise Consultants
Investors in People Accreditation
Robust Details Appointed Inspectors
Notified Body Under Noise Directive 2000/14/EC

Registered Name and Address:

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