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Technical Report

INVESTOR IN PEOPLE

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Project

The Laboratory Determination of The Impact Sound Reduction of a Sample of Floor Covering

Prepared for

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By

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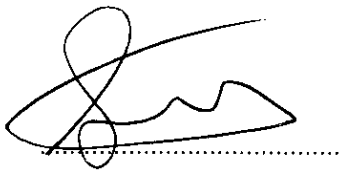
1.0 Summary

Tests have been done in SRL's Laboratory at Holbrook House, Sudbury, Suffolk, to determine the reduction of impact sound of a sample of floor covering in accordance with BS EN ISO 140-8:1998.

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

The results are given in 1/3rd octave bands over the frequency range 100Hz to 5kHz.



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For and on behalf of
Sound Research Laboratories Ltd

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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

17 September 2004

2.3 Instrumentation and Apparatus Used

Make	Description	Type
E D I	Microphone Multiplexer	
	Microphone Power Supply Unit	
Norwegian	Tapping Machine	211
Electronics	Real Time Analyser	830
Olivetti	Computer	M290S
Brüel & Kjaer	12mm Condenser Microphones	4166
	Windshields	UA0237
	Pre Amplifiers	2639
	Microphone Calibrator	4231
Larson Davis	12mm Condenser Microphone	2560
SRL	Power Amplifiers	
Celestion	Loudspeakers	100w

Thermo Hygro	Temperature & Humidity Probe	
TOA	Graphic Equaliser	E-1231

2.4 References

BS EN ISO 140-8:1998	Laboratory measurements of the reduction of transmitted impact noise by floor coverings on a heavyweight standard floor
BS EN ISO 717-2:1997	Rating of sound insulation in buildings and of building elements. Impact Sound Insulation

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3.0 Description of Test

3.1 Description of Sample

Sample of floor covering called Silent Floor Gold.

4mm thick and 3.1kg/m^2.

Sample size 1m x 1.35m.

Sampling plan: none (one sample supplied)

Sample condition: new

Details supplied by Interfloor. Dimensions and weight by SRL

Sample installed by SRL

3.2 Sample Delivery date

1 September 2004

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 Sheet 1 and summarised below.

Results relate only to the items tested.

SRL Test No.	Description in Brief	ΔL_w
1	Silent Floor Gold	24

End of Text

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Data Sheet 1

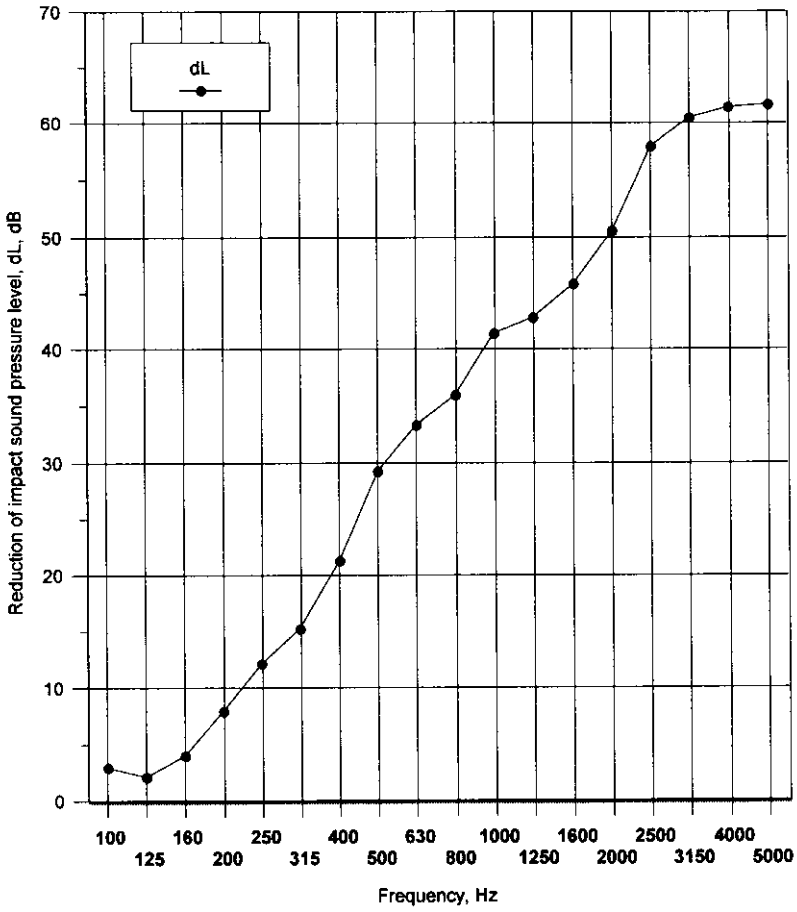
Reduction of impact sound pressure level according to BS EN ISO 140-8 : 1998

Laboratory measurements of the reduction of impact noise by floor coverings on a heavyweight standard floor

Test Number:	E2	**Air temp. in the source room:**	18.4 deg.C
Test Date:	17/09/2004	**Air humidity in the source room:**	64 %
Client:	Interfloor	**Receiving room volume:**	300 m3
Method of mounting:	Loose laid	**Sample mass:**	3.1 kg/m2
Production identification:	Silent Floor Gold	**Thickness:**	4 mm

The sample did not suffer visible damage during the test

Freq f Hz	Ln,0 Third octave dB	dL Third octave dB
100	66.9	3.0
125	67.2	2.2
160	68.0	4.1
200	68.9	8.0
250	70.2	12.2
315	70.8	15.3
400	72.5	21.4
500	72.4	29.4
630	72.5	33.4
800	73.2	36.0
1000	73.6	41.5
1250	74.1	42.9
1600	74.7	45.9
2000	75.1	50.6
2500	75.8	57.9 *
3150	76.1	60.5 *
4000	76.0	61.5 *
5000	73.7	61.7 #



Ln,0 : Is the normalised impact sound pressure level of the heavyweight bare test floor.

dL : Is the reduction of impact sound pressure level resulting from the installation of the sample.

* Denotes results corrected for background # Denotes results at background

Rating according to BS EN ISO 717-2:1997

Weighted reduction of impact sound pressure level of sample and (spectrum adaptation term) =	**dLw (Cld) = 24 (-12) dB**
Weighted normalised impact sound pressure level of bare reference floor and (spectrum adaptation term) =	Ln,r,0,w (Cl,r,0) = 78 (-11) dB
Weighted normalised impact sound pressure level of reference floor with sample and (spectrum adaptation term) =	Ln,r,w (Cl,r) = 54 (1) dB

These results are based on a test made with an artificial source under laboratory conditions (engineering method). v1.6

Appendix 1

Measurement of impact sound reduction of a floor covering in accordance with BS EN ISO 140-8: 1998 - Category 1 (Small Samples) - TP13

In the laboratory, impact sound reduction is determined from the difference a sample floor covering makes to the sound pressure levels generated by a standard impact machine. The impact machine, known as a tapping machine, is operated standing first on a concrete slab and then on the test sample installed on that slab. The test sample is installed on top of the roof of a reverberation room, which is acoustically "live", and 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 and test slab. The measured sound pressure levels are corrected for the amount of sound absorption in the reverberation room.

The reverberation room, which has a volume of 300 cubic metres, is constructed from 215mm brick which is internally plastered with a reinforced concrete roof and floor. The room is isolated from the surrounding structure by resilient mountings and seals, ensuring good acoustic isolation. Reverberation time measurements are done to calibrate the reverberation room.

At least three test samples are installed at predetermined positions. The tapping machine is placed in turn immediately either side of the first test sample/position and operated on the bare concrete roof slab. With the tapping machine operating on the bare slab, the resulting sound pressure levels in the room are sampled using a spaced array of microphones connected to a real time analyser. The signal is filtered into one-third octave bandwidths, integrated and averaged. Six microphones are used with minimum separating distances as follows:

- 0.7m between microphone positions
- 0.7m between any microphone position and room boundaries or diffusers
- 1.0m between any microphone position and the upper floor being excited by the tapping machine

The procedure is then repeated on the bare concrete slab immediately either side of each of the other sample positions. The individual values for the different positions are arithmetically averaged to give the impact sound pressure level ($L_{i,o}$). This is corrected to a reference room absorption, referred to as normalising, to give the normalised impact sound pressure levels ($L_{n,o}$) for the bare concrete slab.

$$L_{n,o} = L_{i,o} + 10\log\frac{A}{Aref} \text{ in decibels}$$

Where A is the actual absorption of the test chamber A_{ref} is the reference room absorption of $10m^2$.

The whole procedure is then repeated in turn on each of the samples to obtain the normalised impact sound pressure levels with covering (L_i) and the corresponding normalised levels (L_n).

The reduction of impact sound pressure level (improvement of impact sound insulation) ΔL, for a given frequency band is determined as follows:

$$\Delta L = L_{n0} - L_n$$

The Weighted Impact Sound Improvement Index ΔL_w, is a single figure rating of impact sound reduction and is calculated in accordance with BS EN ISO 717-2:1997.

The impact sound pressure levels for the test floor with test sample, depend to small extent on the particular test floor itself. To standardise these levels they are adjusted by calculation to what they would be if the bare concrete slab were replaced by a reference floor. The impact sound pressure levels that would be produced on the bare reference floor ($L_{n,o}$) are defined in BS EN ISO 717-2:1997. Using these, the impact sound pressure levels for the sample on the reference floor ($L_{n,r}$) and the corresponding weighted level ($L_{n,w,r}$) are calculated in accordance with the same standard.

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Appendix 2

Measurement Uncertainty
BS EN ISO 140-8:1998 - TP13

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	1
125	1
160	1
200	1
250	1
315	0.7
400	0.7
500	0.7
630	0.7
800	1
1000	1
1250	1
1600	1.2
2000	1.8
2500	1.8
3150	1.8