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TEST REPORT No : 4164-3829

DATE OF ISSUE : 04 March 2019

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**MEASUREMENT OF THE REDUCTION OF TRANSMITTED IMPACT NOISE
BY FLOOR COVERINGS ON A HEAVYWEIGHT STANDARD FLOOR
BS EN ISO 10140-3 : 2010**

CLIENT: Forbo Flooring UK
High Holborn Road
Ripley
Derbyshire
DE5 3NT

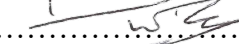
JOB NUMBER: ACOUS/04164

MANUFACTURER: Client

MODEL: Flotex Sheet, lot 4672


DATE ORDER RECEIVED: 14 February 2019

DATE OF TEST: 25 February 2019

Signed:.....

D Wong-McSweeney

Laboratory Manager

Approved:.....

S M Furlong

Specialist Acoustics Technician

2 DESCRIPTION OF TEST PROCEDURE

2.1 Description of Test Facility

The measurements were made in the large reverberation chamber at the University of Salford. The walls of the test room are 330 mm thick and are constructed from Accrington Brick. The floor plan of the room has the shape of a truncated wedge with one pair of parallel walls and one pair of non-parallel walls. The floor and ceiling are parallel and the room surfaces are painted throughout. The test sample was placed on a 3.4 m × 3.4 m × 140 mm thick reinforced homogeneous concrete floor slab which is inserted into the roof of the chamber. The chamber contains 11 randomly orientated plywood diffusing elements to provide a uniform diffuse sound field.

2.2 Test Procedure

The procedure followed that detailed in BS EN ISO 10140-3 : 2010 "Acoustics, Measurement of sound insulation in buildings and of building elements – Part 3: Measurement of impact sound insulation". A standard tapping machine with metal tipped hammers and conforming to Annex E of BS EN ISO 10140-5 : 2010 was used as the impact sound source. The impact sound pressure levels (L_i) produced by the tapping machine in the reverberant room below were measured both with and without the test specimen installed, as detailed in Annex H of BS EN ISO 10140-1. The measured sound pressure levels were normalised according to:

$$L_n = L_i + 10 \log \frac{A}{A_0} \quad \text{dB} \quad (1)$$

where L_n is the normalised impact sound pressure level

A is the measured equivalent absorption area of the receiving room (m^2)

A_0 is reference equivalent absorption area ($A_0 = 10\text{m}^2$)

A is evaluated from the reverberation time using Sabine's formula:

$$A = \frac{0.16V}{T} \quad \text{m}^2 \quad (2)$$

where V is the receiving room volume (m^3)

T is the reverberation time (secs)

The improvement in impact sound insulation IISI (ΔL) is obtained from the equation:

$$\Delta L = L_{n0} - L_n \quad \text{dB} \quad (3)$$

where L_{n0} is the normalised impact sound pressure level in the receiving room in the absence of floor covering

L_n is the normalised impact sound pressure level when the floor covering is in place

The sound pressure levels produced by the tapping machine in the receiving room were measured at 6 microphone positions for each of 3 different positions of the tapping machine and an average level was obtained at each of the one-third octave frequency bands in the range 100 Hz to 5000 Hz. An averaging time of 16 s was used at each microphone position. The microphone positions were chosen such that the distance between positions and between any microphone and a room boundary or sound source exceeded 1.0 m. The distance between any microphone and diffusers exceeded 0.7 m. The microphones were distributed around the room so as to cover the space uniformly.

Five reverberation time measurements were also made at each of the 6 microphone positions and at each of the 2 loudspeaker positions and the results averaged.

3 EQUIPMENT

	Departmental Record No
Norwegian Electronics 1/3 octave band real time analyser type 850 with in-built random noise generator	RTA3-07 to 12
Quad 510 power amplifier	PA7
2 × Norsonic Dodecahedron Loudspeakers	LS10-LS11
4 × Brüel & Kjær random incidence condenser microphone type 4166 in the receiving room	M8, M9 M18, M19
2 × G.R.A.S. random incidence condenser microphones type 40AP in the receiving room	M20, M31
Environmental sensor data logger, hygrometers and barometer	HL1, HG1, HG2, BM2
Norsonic Sound Calibrator type 1251	C8
Toshiba TECRA R850 119 laptop computer and related peripheral equipment (network switch, printer, monitor etc.)	RTA3-00
Yamaha GQ1031BII graphic equalizer	GEQ1

4 RESULTS

The Improvement in Impact Sound Insulation IISI (ΔL) for each sample, given in 1/3 octave bands, can be found together with the relevant rating units $C_{I,\Delta}$, $C_{I,r}$ and $C_{I,O}$ as defined in ISO 717-2 :2013 on the following pages.

Receiving room volume:	221 m ³
Mass of tapping machine:	10 kg
Dimensions of tapping machine:	600 mm × 140 mm × 260 mm
Hammer material:	Metal
Number of tapping machine supports:	3
Environment:	
Temperature “source” room:	22.7 ± 0.3 °C
Humidity “source” room:	22.7 ± 3.0 %
Temperature receiver room:	20.8 ± 0.3 °C
Humidity receiver room:	35.3 ± 3.0 %
Static pressure	103.2 ± 0.2 kPa
Sample thickness:	4.2 mm
Sample size:	Three samples of 1000 mm × 500 mm
Sample description:	See individual results sheet for details
Sample supplied by:	Client
Method of mounting:	Loose laid on concrete floor
Sample manufacturer’s address:	See client details
Significant damage observations:	No damage was observed on the sample

The results here presented relate only to the items tested and described in this report.

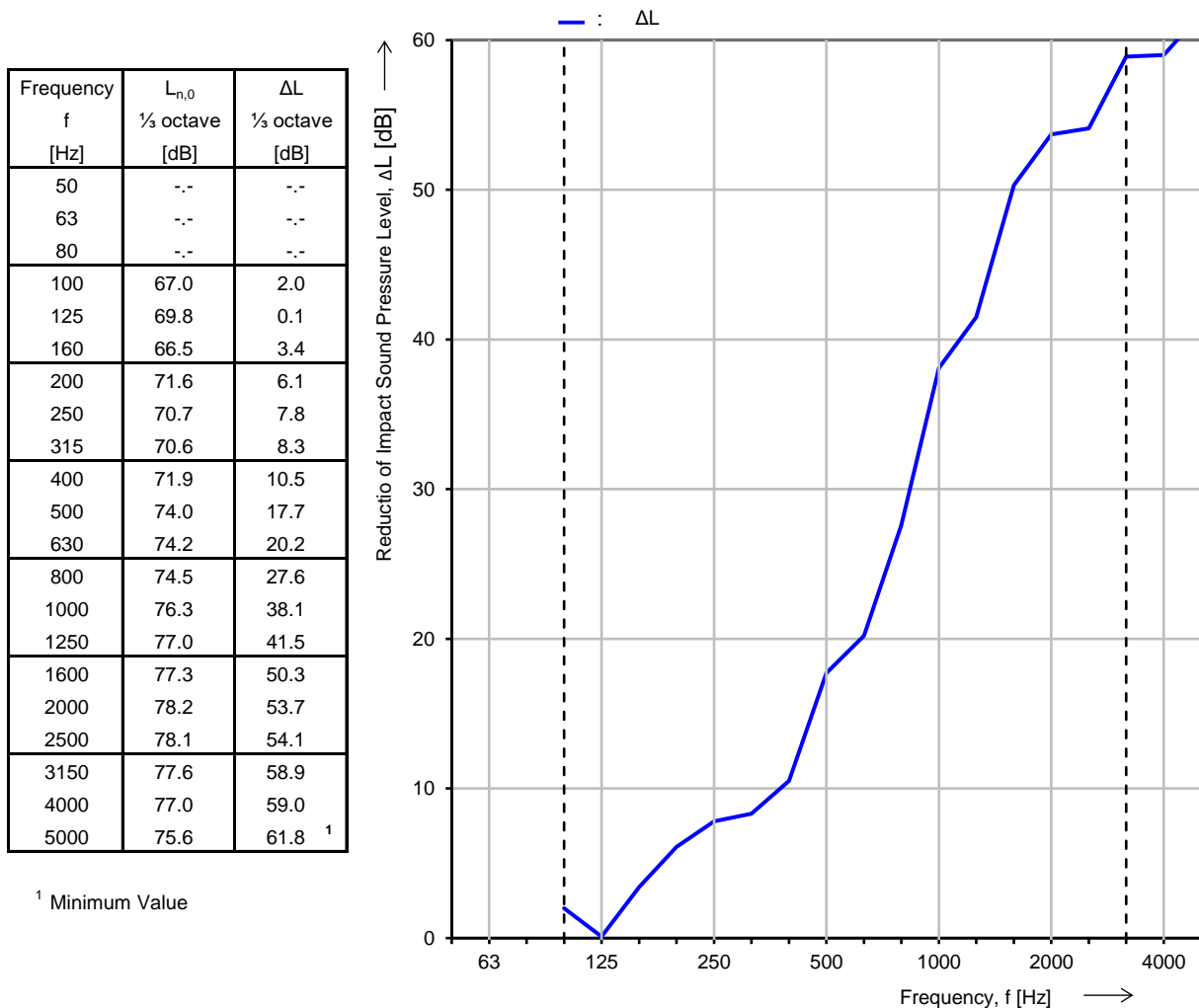
The test samples were loose laid directly on the bare concrete test floor and were not loaded.

Note: These results are based on tests made with an artificial source under laboratory conditions.

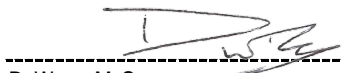
BS EN ISO 10140-3:2010 Acoustics - Laboratory measurement of the reduction of transmitted impact noise by floor coverings on a heavyweight standard floor

Client:	Forbo Flooring UK	Product Identification:	Flotex Sheet, lot 4672
Mounted by:	University of Salford, Acoustic Test Lab.	Test Room Identification:	Acoustic Transmission Suite
Manufacturer:	Client	Date of Test:	25 February 2019
Description:	Carpet - Category I		

Curing Time:	Not Applicable	Source Room Temperature:	22.7 °C
Ambient Pressure:	103.2 kPa	Source Room Relative Humidity:	22.7 %
Mass per unit area:	1.8 kg/m ²	Receiving Room Temperature:	20.8 °C
Size / number of samples:	Three 1000mm x 500mm samples	Receiving Room Relative Humidity:	35.3 %
Receiving Room Volume:	221 m ³		



Rating according to BS EN ISO 717-2		
ΔL_W = 21 dB	C_{LΔ} = -9 dB	C_{Lr} = -2 dB
Evaluation based on laboratory measurement results obtained in one-third-octave bands by an engineering method.		

Name of test institute:	The University of Salford, Acoustic Test Lab.	Signature:	
No. of test report:	4164-3829	Operator:	D. Wong-McSweeney
Date:	25 February 2019		