BTTG

BCTC

CARPET TECHNICAL CENTRE

Confidential Report

Our Ref: 25/07011N/01/16

Notified Body
for PPE Directive,
Construction Products
Regulation & Marine
Equipment Directive
I.D. No. 0338 & 0339

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22 February 2016

Our Ref: 25/07011N/01/16
Your Ref:

Forbo Flooring UK Ltd
High Holborn Road
Ripley
Derbyshire
Derby
DE5 3NT

Job Title:	**Sound Absorption Coefficient and Impact Sound Transmission on One Sample of Carpet Tiles**
Clients Order Ref:	4500815761/4500815768
Date of Receipt:	14 January 2016
Reference:	**Outline**
Description of Sample:	Loop Pile Bitumen Backed Tufted Carpet Tiles
Measurements:	50cm x 50cm
Work Requested:	BCTC were requested to carry out Sound Absorption Coefficient and Impact Sound Transmission Tests on the sample of carpet tiles supplied.

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Improvement of Impact Sound Insulation

The measurements were made in a large reverberation chamber at the University of Salford. The walls of the test room are 330mm 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 no-parallel walls. The floor and ceiling are parallel and the room surfaces are painted throughout. The test sample was placed on a 3.4m x 3.4m x 140mm 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.

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 the impact sound insulation" A standard tapping machine with metal tipped hammers and confirming to Annex E of BS EN ISO 140-5:2010 was used as the impact sound source. The impact sound pressure levels (Li) 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 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 100Hz to 5000Hz. An averaging time of 16s 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 1m. The distance between any microphone and diffusers exceeded 0.7m. 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.

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The results are given in the following table.

One-third Octave Band Centre Frequency (Hz)	Improvement In Impact Sound Insulation (dB)
100	4.5
125	4.7
160	7.3
200	12.2
250	15.7
315	17.0
400	25.3
500	26.3
630	30.8
800	37.0
1000	43.1
1250	44.4
1600	48.6
2000	55.0
2500	56.5
3150	58.7
4000	60.2
5000	63.6[1]

[1] Minimum value

Improvement of impact sound (ΔL_w) = 27 dB

Note

Tests subcontracted to The University of Salford, UKAS testing no. 1262.

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Random Incidence Sound Absorption Coefficient

The sample was laid to cover an area measuring 3m x 4m directly on the concrete floor of the test facility.

The tests were carried out in a large reverberation chamber. The room has been designed with hard surfaces and non-parallel walls to give long empty room reverberation times with uniform decays. It has the shape of a truncated wedge. In addition, 11 plywood panels, each panel 1.22m x 2.44m, were hung in the room to improve the diffusivity of the sound field. The test sample was placed in the centre of the floor. The excitation signal comprised wide band random noise played into the room via a loudspeaker mounted in a cabinet facing a corner. The sound was monitored at each of 6 microphone positions. The room is 7.4m long x ~6.6m wide x 4.5m high. It has a volume of 220m³ and a total surface area of 224m². The volume of the room permits a maximum sample size of 12.79m², in accordance with Clause 6.2.1.1 specified in BS EN ISO 354:2003, “Acoustics - Measurement of sound absorption in a reverberation room”.

The procedure followed that detailed in BS EN ISO 354:2003. Measurements were made on the rate of decay of sound in the test chamber with and without the sample in place. The frequency range from 100Hz to 5000Hz was covered in one third octave bands. An average reverberation time was taken from 5 decays at each of 6 microphone positions for each of two loudspeaker positions (i.e. 60 decays per third octave band). The decays were produced by exciting the room with amplified wide band random noise and stopping the excitation once the chamber became saturated. The time taken for the sound to decay by 20dB is measured and tripled to give the reverberation time. The reverberation time was obtained from the arithmetically averaged decays at each frequency. The measurements with and without the sample in the room were carried out consecutively to avoid significant changes in relative humidity and temperature which influence air absorption at higher frequencies.

For most purposes the absorption coefficient at each octave interval is sufficient and these are given in the following table.

Frequency (Hz)	Average Absorption Coefficient (1/1 Octave)
100 - 160	0.00
200 - 315	0.05
400 - 630	0.05
800 - 1250	0.20
1600 - 2500	0.30
3150 - 5000	0.35

Noise reduction coefficient (250 - 2000 Hz) is 0.15

Classification: E

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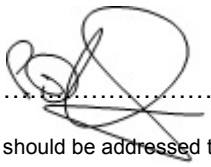
Reported by:  P Doherty, Operational Head

Enquiries concerning this report should be addressed to Customer Services.