

18 October 2016

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Estimated Airborne and Impact Sound Ratings of 5 mm vinyl plank flooring on 200 mm thick concrete, no ceiling

Dunlop Flooring commissioned an impact sound insulation test on a vinyl plank floor without underlay at CSIRO in November 2015. A description of the floor and the test results are provided in **Table 1**.

Table 1 Test System and Results, CSIRO INR 206-03-1

System component	Thickness
(a) Vinyl plank flooring	5 mm
(b) Concrete slab	150 mm
$L_{n,w}$ (Weighted normalised impact sound pressure level)	67 dB
C_i (Spectrum adaptation term for impact sound level)	-7
$L_{n,w} + C_i$	60 dB
ΔL (delta L)	10 dB
IIC (Impact insulation class)	43

The required acoustic ratings for floor/ceilings separating apartments, and separating apartments from other uses, are provided in the *National Construction Code 2016 Building Code of Australia* (BCA) and are reproduced in **Table 2**.

Table 2 BCA Requirements for Floor / Ceiling Systems

Construction	BCA 2016	
	Laboratory Rating (Deemed to Satisfy)	Verification Method Requirements
Floors between sole-occupancy units or between a sole-occupancy unit and a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification.	$R_w + C_{tr}$ not < 50 dB $L_{n,w}^1$. not > 62 dB	$D_{nT,w} + C_{tr}$ not < 45 dB $L'_{nT,w}^2$. not > 62 dB

The BCA impact sound ratings do not provide for a high level of acoustic amenity and for this reason the Association of Australian Acoustical Consultants (AAAC) recommend higher standards in their Guideline for Apartment and Townhouse Acoustic Rating (September 2010). The AAAC star rating guide for impact sound is provided in **Table 3**. A four star rating corresponds to 'medium' quality.

¹ The impact sound requirements of the BCA changed in 2016 from $L_{n,w} + C_i$ to $L_{n,w}$.

² As above.

Table 3 AAAC Star Rating Guide for Impact Sound, $L_{nT,w}$

	2 Star	3 Star	4 Star	5 Star	6 Star
Between Tenancies	65	55	50	45	40

Acoustic estimations for the impact and airborne sound ratings of the floor system installed with a 200 mm thick concrete slab are provided in **Table 4**. Estimations are based on laboratory tests conducted on similar floor/ceiling systems and on prediction.

Table 4 Acoustic Estimations³

System component	
(a) Vinyl plank flooring	5 mm
(b) Slab thickness: 200 mm	200 mm
$L_{n,w}$, dB (lower rating = better quality)	64
C_i , dB (correction term)	-7
$L_{n,w} + C_i$, dB	57
IIC (higher rating = better quality)	46
R_w , dB (weighted sound reduction index. Higher rating = better quality)	58
$R_w + C_{tr}$, dB (weighted sound reduction index plus spectrum adaptation term. Higher rating = better quality)	53

NOTE: The expected tolerance is ± 2 dB for $L_{n,w} + C_i$. This allows for variations in the test method, the difference between laboratories and the accuracy of the estimating techniques.

Dunlop 5 mm thick Vinyl Plank flooring on a 150 mm thick concrete slab complied with the BCA (Building Code of Australia) impact sound criterion of $L_{n,w} + C_i$ not greater than 62 dB. The tested floor system installed on a thicker slab is predicted to achieve ratings of a higher quality than the minimum standard required by the BCA.

Note: A 10 dB change in level is generally perceived as a doubling or halving of the sound level. For example, impact sound via a floor with an $L_{n,w}$ rating of 60 dB will subjectively be perceived as being twice as loud as impact sound via a floor with an $L_{n,w}$ rating of 50 dB.

³ The expected tolerance is ± 2 dB for the $L_{n,w}$ and $L_{n,w} + C_i$. This allows for variations in the test method, the difference between laboratories and the accuracy of the estimating techniques. The expected tolerance is ± 2 dB for the R_w and ± 2 dB $R_w + C_{tr}$. This allows for variations in the test method, the difference between laboratories and the accuracy of the estimating techniques.