

**ACOUSTIC  
FLOORING  
GUIDE**

HYBRID, VINYL TILES & PLANKS

*Signature*





Quattro, Bristle Oak

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## The health impacts of residential acoustics

Flooring acoustics are an extremely important consideration in multi-residential building design and construction. In developed countries, people spend 80-90% of their time indoors. Because of this, comfort and health related effects are directly linked to the characteristics of the building. Recognising the importance of acoustics during building design and construction can help to minimise the impact of noise on residents health and wellbeing.

Surveys have shown that noise is an important environmental concern for most New Zealanders. A systematic review by the World Health Organisation found that sleep restrictions and chronically disturbed sleep is associated with numerous negative health outcomes, and therefore noise-induced sleep disturbance is considered one of the most important effects of environmental noise exposure.

Through considered architectural acoustics and proper selection of flooring during the planning stage, we can help to create a positive experience for residents and enhance a building's function and improve the quality of your living environments.



Excessive noise can interfere with sleep, cause fatigue, irritability, headaches and stress.

Acoustic Wood, New England Blackbutt



# Acoustic requirements

There are specific requirements for acoustics specified in the New Zealand Building Code (NZBC). The NZBC ensures that the materials used in these projects conform to strict standards which ensure safety, health, well being and comfort of the end occupants.

The NZBC requirements only apply to residential uses.

**Functional requirement:** G6.2 *Building elements* which are common between occupancies, shall be constructed to prevent undue noise transmission from other occupancies or common spaces, to the *habitable spaces of household units.*



Castlemaine, Ebony Oak



## How is sound measured?

### Loudness

is most often measured in decibels (dB), it refers to the amount of sound energy present.

### Frequency

is measured in hertz (Hz) and refers to the length of sound waves – lower frequencies have longer waves, higher frequencies have shorter waves.



## Impact Insulation Class



Impact Insulation Class is a measurement of impact sound energy that is transferred via the floor and ceiling structure to the room below.

It is important when determining how every day activities such as footsteps and dragging chairs will impact on the inhabitants below.

Impact Insulation Class is tested in a lab by using a tapping machine on the top floor and a receiver in the floor below.

The IIC is calculated per ASTM E-989 as IIC.

The higher the result the better the acoustic performance, because less noise is being transferred to the floor below.

## NZBC requirements for Impact Insulation Class



### Product Compliance

This test is the product manufacturers responsibility, lab tests should be provided in order to be considered on a project.

#### Impact Insulation Class Testing (Clause G6 3.2 NZBC)

IIC no less than 55 dB

**ASTM E 492: 2009** Test method for laboratory measurement of impact sound transmission through floor-ceiling assemblies using the tapping machine

### Building Compliance

This test is the builders responsibility on completion of the project, it is an on site test, which needs to be provided in order to earn a certificate of occupancy.

#### Impact Insulation Class Testing (Clause G6 3.2 NZBC)

FIIC no less than 50 dB

**ASTM E 989: 2018** Classification for determination of impact insulation class (IIC)

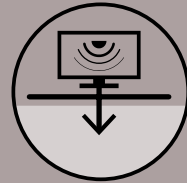
Signature Floors has engaged the support of Marshall Day Acoustics to provide acoustic predictions.



Acoustic Stone, Argento



## Airborne sound insulation



Airborne sound insulation measures the airborne sound reduction of flooring to the room below.

Examples of airborne noise are sounds generated within a space such as conversations, televisions and music.

The outcome of this measurement is mostly impacted by the structural wall and floor construction and therefore must be tested on site taking into account all building materials.

Whilst the floorcovering can effect the result, its impact is minimal so floor products are not typically tested alone.

Airborne sound insulation is tested in a lab by playing a loud noise in top room with a receiver measuring the sound transmission reduction in the room below.

The test method used for measurement is calculated in decibels using ISO 717.1 as  $R_w + C_{tr}$ .

The higher the result the better the acoustic performance, as it indicates a higher reduction in sound transfer.

## Sound absorption / STC



Sound Absorption is a measurement of how much sound energy is absorbed by the flooring product. These properties are important when considering individual room acoustics because they can limit the stress caused by noise in an environment such as conversations, phones ringing and televisions. The sound absorption properties of flooring are tested in a lab by directing sound at the flooring and measuring how much sound is reflected back.

There are three measurements that indicate the level of sound absorption:

<b><math>\alpha_w</math> (Alpha w):</b>	<b>SAA:</b>	<b>NRC:</b>
Measurement AS ISO 354-2006	ASTM C423	ATSM C423

All three tests measure sound absorption however each test measures slightly different frequencies. The results are expressed by a figure ranging from 0 to 1. A result of 0 means 0% sound is absorbed and a result of 1 means 100% sound absorption.

In general, vinyl tiles and planks offer less sound absorption than carpet as they are inherently more reflective. In comparison our Comfi Bak carpet tiles can offer approximately 30% sound absorption when compared to vinyl planks and tiles at approximately 2-5% absorption. Hence we do not typically test vinyl plank and tiles for their absorption properties as other factors in the space will have a great effect on sound absorption.

However, vinyl planks and tiles do offer better sound absorbing qualities than polished concrete (0-5%) and can contribute to improving the acoustic qualities of a space when combined with other acoustic materials.



## Acoustic 6mm Hybrid Tile & Plank

built-in underlay



Impact Noise Reduction $\Delta L_w$
<b>19 dB</b>
NZBC Impact Insulation Class IIC ( $\leq 55$ dB)
<b>58 dB*</b>
* Prediction result 150mm Slab, 10mm Plaster Board, Cavity Insulation

Applicable ranges: Alpha, Classic, Wideboard, Quattro, Acoustics 6.0

Quattro, Sherwood Oak



## 5mm Vinyl Tile & Plank

2mm underlay

Impact Noise Reduction $\Delta L_w$
<b>18 dB</b>
NZBC Impact Insulation Class IIC ( $\leq 55$ dB)
<b>59 dB*</b>
* Prediction result 150mm Slab, 10mm Plaster Board, Cavity Insulation

Applicable ranges: Wood 5.0, Stone 5.0, Colour 5.0, Deluxe, Momentum, Daylesford

Marble Stone, Alpine

## 5mm Vinyl Tile & Plank

no underlay



Impact Noise Reduction $\Delta L_w$
<b>7 dB</b>
NZBC Impact Insulation Class IIC ( $\leq 55$ dB)
<b>56 dB*</b>
* Prediction result 150mm Slab, 10mm Plaster Board, Cavity Insulation

Applicable ranges: Wood 5.0, Stone 5.0, Colour 5.0, Deluxe, Momentum, Daylesford

Colour, Scarlet



## 4.5mm Vinyl Tile & Plank

2mm underlay

Impact Noise Reduction

$\Delta L_w$

**18 dB**

NZBC Impact Insulation Class

IIC ( $\leq 55$  dB)

**61 dB\***

\* Prediction result 150mm Slab,  
10mm Plaster Board,  
Cavity Insulation



Applicable ranges: Multilay Wideboard, Castlemaine, Empire XL, Arnhem Land

Castlemaine, Stringybark Spotted Gum



## 4.5mm Vinyl Tile & Plank

no underlay

Impact Noise Reduction $\Delta L_w$
<b>8 dB</b>
NZBC Impact Insulation Class IIC ( $\leq 55$ dB)
<b>58 dB*</b>
* Prediction result 150mm Slab, 10mm Plaster Board, Cavity Insulation

Applicable ranges: Multilay Wideboard, Castlemaine, Empire XL, Arnhem Land

Castlemaine, Tiger Oak



## 2.5mm Vinyl Tile & Plank

2mm underlay

Impact Noise Reduction $\Delta L_w$
<b>18 dB</b>
NZBC Impact Insulation Class IIC ( $\leq 55$ dB)
<b>59 dB*</b>
* Prediction result 150mm Slab, 10mm Plaster Board, Cavity Insulation

Applicable ranges: Zenith, Kenzie, Wood 2.5

Wood, Quarry Oak

## Acoustic 6mm Hybrid Tile & Plank

built-in underlay



Ceiling	Cavity Insulation Present	150mm Concrete	180mm Concrete	200mm Concrete
Thickness/Layers		Impact Insulation Class	Impact Insulation Class	Impact Insulation Class
1 x 10mm Plaster Board (100mm cavity suspended light steel grid with 450mm spacing)	No	IIC 49	IIC 50	IIC 52
	Yes	IIC 58	IIC 60	IIC 61
1 x 13mm Plaster Board (100mm cavity suspended light steel grid with 450mm spacing)	No	IIC 50	IIC 52	IIC 54
	Yes	IIC 61	IIC 62	IIC 64
1 x 13mm Plaster Board (200mm cavity suspended light steel grid with 450mm spacing)	No	IIC 54	IIC 56	IIC 58
	Yes	IIC 66	IIC 68	IIC 70
2 x 13mm Plaster Board (200mm cavity suspended light steel grid with 450mm spacing)	No	IIC 56	IIC 58	IIC 60
	Yes	IIC 71	IIC 73	IIC 75

■ Fails standard  
 ■ Within in situ tolerance  
 ■ Exceeds standard



### 5mm Vinyl Tile & Plank

2mm underlay



Ceiling	Cavity Insulation Present	150mm Concrete	180mm Concrete	200mm Concrete
Thickness/Layers		Impact Insulation Class	Impact Insulation Class	Impact Insulation Class
1 x 10mm Plaster Board (100mm cavity suspended light steel grid with 450mm spacing)	No	IIC 50	IIC 51	IIC 53
	Yes	IIC 59	IIC 61	IIC 62
1 x 13mm Plaster Board (100mm cavity suspended light steel grid with 450mm spacing)	No	IIC 51	IIC 53	IIC 55
	Yes	IIC 62	IIC 63	IIC 65
1 x 13mm Plaster Board (200mm cavity suspended light steel grid with 450mm spacing)	No	IIC 54	IIC 57	IIC 59
	Yes	IIC 67	IIC 69	IIC 71
2 x 13mm Plaster Board (200mm cavity suspended light steel grid with 450mm spacing)	No	IIC 57	IIC 59	IIC 61
	Yes	IIC 72	IIC 74	IIC 76

■ Fails standard   
 ■ Within in situ tolerance   
 ■ Exceeds standard

### 5mm Vinyl Tile & Plank

no underlay



Ceiling	Cavity Insulation Present	150mm Concrete	180mm Concrete	200mm Concrete
Thickness/Layers		Impact Insulation Class	Impact Insulation Class	Impact Insulation Class
1 x 10mm Plaster Board (100mm cavity suspended light steel grid with 450mm spacing)	No	IIC 50	IIC 48	IIC 49
	Yes	IIC 56	IIC 57	IIC 59
1 x 13mm Plaster Board (100mm cavity suspended light steel grid with 450mm spacing)	No	IIC 47	IIC 49	IIC 49
	Yes	IIC 52	IIC 54	IIC 56
1 x 13mm Plaster Board (200mm cavity suspended light steel grid with 450mm spacing)	No	IIC 50	IIC 52	IIC 53
	Yes	IIC 52	IIC 54	IIC 56
2 x 13mm Plaster Board (200mm cavity suspended light steel grid with 450mm spacing)	No	IIC 52	IIC 54	IIC 55
	Yes	IIC 52	IIC 55	IIC 56

■ Fails standard  
 ■ Within in situ tolerance  
 ■ Exceeds standard



### 4.5mm Vinyl Tile & Plank

2mm underlay



Ceiling	Cavity Insulation Present	150mm Concrete	180mm Concrete	200mm Concrete
Thickness/Layers		Impact Insulation Class	Impact Insulation Class	Impact Insulation Class
1 x 10mm Plaster Board (100mm cavity suspended light steel grid with 450mm spacing)	No	IIC 51	IIC 50	IIC 52
	Yes	IIC 61	IIC 60	IIC 61
1 x 13mm Plaster Board (100mm cavity suspended light steel grid with 450mm spacing)	No	IIC 53	IIC 52	IIC 54
	Yes	IIC 64	IIC 62	IIC 64
1 x 13mm Plaster Board (200mm cavity suspended light steel grid with 450mm spacing)	No	IIC 57	IIC 56	IIC 58
	Yes	IIC 68	IIC 68	IIC 70
2 x 13mm Plaster Board (200mm cavity suspended light steel grid with 450mm spacing)	No	IIC 59	IIC 58	IIC 60
	Yes	IIC 70	IIC 73	IIC 75

■ Fails standard   
 ■ Within in situ tolerance   
 ■ Exceeds standard

### 4.5mm Vinyl Tile & Plank

no underlay



Ceiling	Cavity Insulation Present	150mm Concrete	180mm Concrete	200mm Concrete
Thickness/Layers		Impact Insulation Class	Impact Insulation Class	Impact Insulation Class
1 x 10mm Plaster Board (100mm cavity suspended light steel grid with 450mm spacing)	No	IIC 51	IIC 49	IIC 50
	Yes	IIC 58	IIC 58	IIC 60
1 x 13mm Plaster Board (100mm cavity suspended light steel grid with 450mm spacing)	No	IIC 50	IIC 50	IIC 52
	Yes	IIC 56	IIC 58	IIC 59
1 x 13mm Plaster Board (200mm cavity suspended light steel grid with 450mm spacing)	No	IIC 53	IIC 54	IIC 56
	Yes	IIC 55	IIC 58	IIC 59
2 x 13mm Plaster Board (200mm cavity suspended light steel grid with 450mm spacing)	No	IIC 55	IIC 56	IIC 58
	Yes	IIC 56	IIC 58	IIC 59

■ Fails standard   
 ■ Within in situ tolerance   
 ■ Exceeds standard



## 2.5mm Vinyl Tile & Plank

2mm underlay



Ceiling	Cavity Insulation Present	150mm Concrete	180mm Concrete	200mm Concrete
Thickness/Layers		Impact Insulation Class	Impact Insulation Class	Impact Insulation Class
1 x 10mm Plaster Board (100mm cavity suspended light steel grid with 450mm spacing)	No	IIC 50	IIC 51	IIC 53
	Yes	IIC 59	IIC 60	IIC 62
1 x 13mm Plaster Board (100mm cavity suspended light steel grid with 450mm spacing)	No	IIC 51	IIC 53	IIC 54
	Yes	IIC 61	IIC 63	IIC 65
1 x 13mm Plaster Board (200mm cavity suspended light steel grid with 450mm spacing)	No	IIC 53	IIC 57	IIC 59
	Yes	IIC 67	IIC 69	IIC 70
2 x 13mm Plaster Board (200mm cavity suspended light steel grid with 450mm spacing)	No	IIC 56	IIC 59	IIC 61
	Yes	IIC 72	IIC 74	IIC 75

■ Fails standard   
 ■ Within in situ tolerance   
 ■ Exceeds standard

**innovation & inspiration**



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