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## **CERTIFICATE OF PERFORMANCE**

### **IMPACT SOUND INSULATION**

#### **LUMIERE ULTRA HD HYBRID PLANK FLOORING**

#### **BELLE VIE HERRINGBON HYBRID COLLECTION FLOORING**

#### **TOPDECK FLOORING**

**Issue Date:** Friday, 28 October 2022

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**CERTIFICATE OF PERFORMANCE**  
**IMPACT SOUND INSULATION**  
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## 1.0 CONSULTANT'S BRIEF

Koikas Acoustics was requested by Topdeck Flooring to conduct impact noise tests of the following floor systems:

- Test 01: Lumiere Ultra HD Hybrid Plank Flooring
- Test 02: Belle Vie Herringbon Hybrid Collection Flooring

A total of two (2) tests were conducted which included the base ceiling/floor system of a concrete slab and suspended ceiling.

The purpose of undertaking these impact noise tests was to quantify the acoustic performance of the flooring systems.

Test results were compared to the acoustic requirements of *Part F5 of BCA (Building Codes of Australia)* and the standards prescribed by the *Association of Australasian Acoustical Consultants (AAAC)*.

All measurements were carried out as per the guidelines and procedures outlined in:

- *AS/NZS ISO 140.7:2006 "Field measurements of impact sound insulation of floors"*

The rating was determined as per

- *AS ISO 717.2-2004 "Rating of sound insulation in buildings and of building elements"*.



## 2.0 IMPACT NOISE COMPLIANCE TESTING

### 2.1 PARTITION SYSTEM

Koikas Acoustics has been advised that the ceiling/floor system between the residential units is constructed with the following building materials:

- Approximately 180-200 mm thick concrete slab, and
- Unknown ceiling finish.

Hereafter referred to as the “*existing ceiling/floor system*” (ECFS).

The tests were conducted with the following floor covering in conjunction with the selected flooring over the ECFS:

- Test 00: Bare concrete floor (ECFS only) – *for comparison purposes only*
- Test 01: Lumiere Ultra HD Hybrid Plank Flooring + ECFS
- Test 02: Belle Vie Herringbon Hybrid Collection Flooring + ECFS



## 2.2 IMPACT NOISE REQUIREMENTS

### 2.2.1 BCA REQUIREMENT

For verification of the impact noise rating for floors, Part FV5.1 (b) of the latest update of the Building Code of Australia (BCA) 2019 states:

*Impact: a weighted standardised impact sound pressure level ( $L_{nT,w}$ ) not more than 62 when determine under AS ISO 717.2.*

### 2.2.2 AAAC STAR RATING PERFORMANCE REQUIREMENTS

Reproduced from the Association of Australasian Acoustical Consultants (AAAC) Guideline for Apartment and Townhouse Acoustic Ratings, the following Table (Section C) describes the acoustic ratings regarding the Star Rating System.

Table 1. Star Rating requirements for Inter-tenancy Activities – Published by the AAAC					
INTER-TENANCY ACTIVITIES	2 Star	3 Star	4 Star	5 Star	6 Star
(c) Impact isolation of floors					
- Between tenancies $L_{nTw} \leq$	65	55	50	45	40
- Between all other spaces & tenancies $L_{nTw} \leq$	65	55	50	45	40

Note, Koikas Acoustics is of the understanding that the impact noise ratings in Table 1 infer  $L'_{nTw}$  and not  $L_{nTw}$ .  $L_{nTw}$  is an impact noise rating derived from tests undertaken in a laboratory and  $L'_{nTw}$  is derived from field tests.



## **3.0 ASSESSMENT/TESTING PROCEDURES**

### **3.1 PARTITION TESTING**

#### **3.1.1 Generation of the sound field in the source room**

The sound field was generated by a Cesva MI006 tapping machine situated in the source room on the specific floor under test. Several measurement positions on each floor were tested as required by the standard.

#### **3.1.2 Receiving space measurement**

Impact noise levels were recorded in the receiving space with an NTi Audio XL2 spectrum analyser sound level meter. The spatial-averaging method of measurement was employed for impact noise tests with relevant traverse durations and minimum distances to reflectors and boundary walls observed.

#### **3.1.3 Reverberation time and background noise**

Additional measurements were taken of the background noise ( $L_b$ ) and reverberation time ( $T$ ). The background noise measurement was used to ensure that existing ambient noise did not influence the internal noise measurement. The reverberation time was used to calculate the amount of absorption ( $A$ ) in the receiving room so that the measurement can be standardised to a reference reverberation time of 0.5 seconds.



## 4.0 MEASURED RESULTS AND ANALYSIS

The results of the acoustic tests are tabulated below. Comprehensive measurement and analysis data are presented as an Appendix to this report.

Table 2. Summary of impact noise test results			
Flooring Sample	$L'_{nT,w}$	AAAC Star Rating	FIIC
<b>Test 00:</b> Bare concrete floor (ECFS only) – for comparison purposes only	55	3	50
<b>Test 01:</b> Lumiere Ultra HD Hybrid Plank Flooring + ECFS	40	6	70
<b>Test 02:</b> Belle Vie Herringbon Hybrid Collection Flooring + ECFS	40	6	69

Detailed calculations of the partition system impact noise insulation (ceiling/floor) are attached as **Appendix A**.

The following are also noted:

1. All tests were undertaken with the existing ceiling/floor system consisting of between 180-200 mm thick concrete sub-base with an unknown ceiling.
2. The tested flooring system as listed in Table 2 (Test 01-02) has achieved both the BCA 2019 minimum requirement ( $L_{nT,w} \leq 62$ ) and the AAAC Star rating of 5 for impact noise insulation.
3. The lower the  $L'_{nT,w}$  rating the better the impact insulation.
4. The relation between Field Impact Insulation Class (FIIC) and Impact Insulation Class (IIC) can be described by the formula  $FIIC + 5 \approx IIC$ .
5. The higher the IIC and FIIC the better the impact insulation.
6. The higher the AAAC Star Rating the better the impact insulation.
7. The information contained herein should not be reproduced except in full.





8. The information provided in this report relates to acoustic matters only. Supplementary advice should be sought for other matters relating to flooring installation, construction, design, structural, fire-rating, waterproofing and the like.
9. Product installation details and methodologies must be sought from the product supplier, installer or other experts. Koikas Acoustics is not liable for any product defects.
10. The acoustic ratings provided in this report are indicative of a 1 m<sup>2</sup> sample and should be used for comparative purposes only. Acoustic ratings will vary depending on:
  - the testing environment/conditions,
  - materials/structures of the existing ceiling/floor system,
  - room volume,
  - internal layout and
  - workmanship.

Even with the same testing environment, acoustic ratings can vary from room to room and between buildings as no two buildings are identical. A fully laid flooring system typically presents a lower acoustical rating, i.e. up to 3 rating points less. For example, where the test results are compared against a 1 m<sup>2</sup> sample flooring system resulting in  $L'_{nTw}$  41, the same flooring laid from wall to wall could result in an acoustical rating of up to  $L'_{nTw}$  44 or more, which is a reduction in the acoustical performance rating.

11. Floor covering must not make contact with any walls or joineries (kitchen benches, cupboards etc). During the installation of any hard floor coverings, temporary spaces of 5~10mm should be used to isolate the floor covering from walls and/or joineries and the resulting gaps should be filled with a suitable mastic type sealant or off-cut of underlay or the equivalent where available. The acoustic integrity could be degraded if the above precautions and treatments are not implemented. Refer to Figures 1 and 2 below for details of the proper installation of flooring materials.



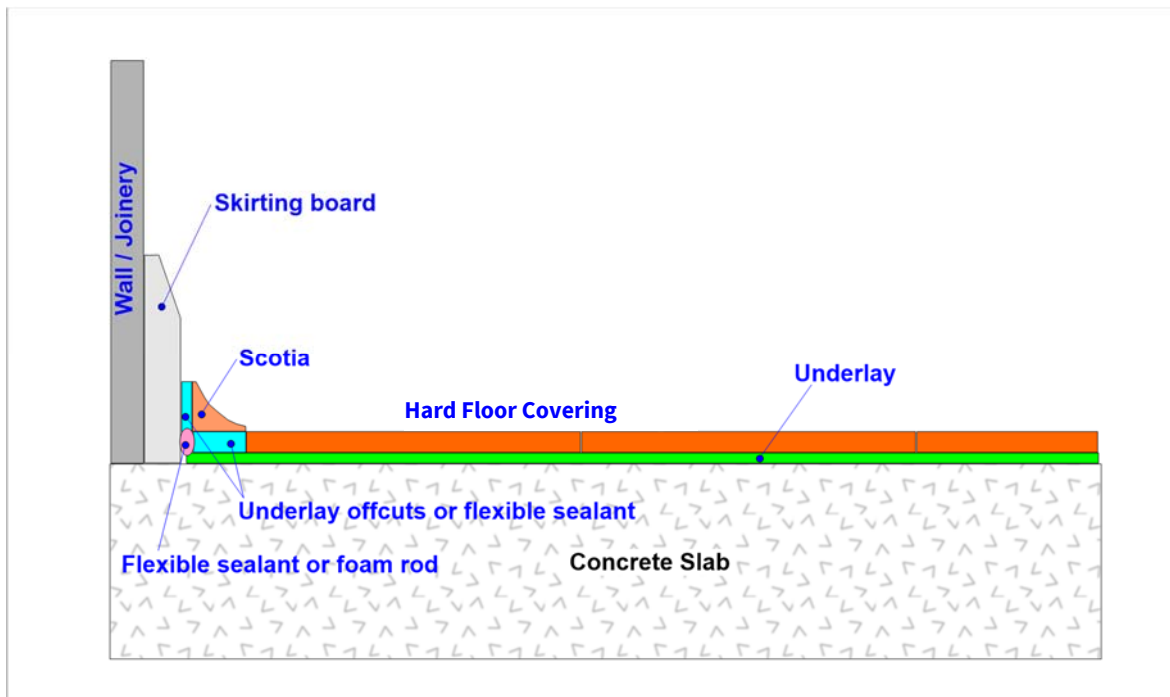


Figure 1. Wall / Joinery details (skirting board & scotia)

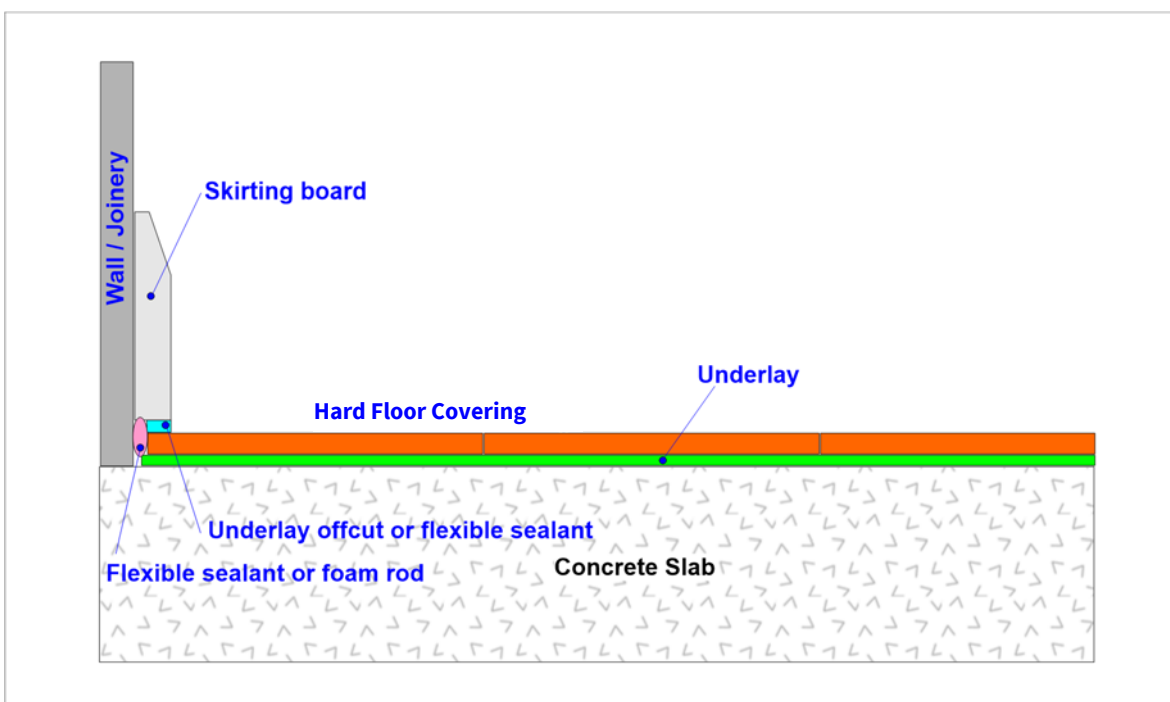


Figure 2. Wall / Joinery details (skirting board)

## 5.0 CONCLUSION

Koikas Acoustics was requested by Topdeck Flooring to undertake impact noise tests of the various flooring systems. The acoustic performances of various ceiling/floor configurations were calculated and compared against the acoustic requirements of the current BCA and AAAC Star Ratings that are commonly used in Australia.

The calculated acoustic rating of the tested flooring system is summarised and presented in **Table 2** of this report. A detailed test certificate is provided in **Appendix A**.

The acoustic ratings provided in this report are indicative and should be used for comparative purposes only. Acoustical ratings will vary depending on several factors:

- the testing environment/conditions
- materials/structures of the existing ceiling/floor system,
- room volume,
- internal layout and
- workmanship.

Even with the same testing environment/conditions, acoustic ratings would still vary from building to building.

It is recommended that in-situ testing be conducted before any full fit-out as the sub-base ceiling/floor system and the wall junctions could impact the noise transfer to the unit below.

This report should be reproduced in full including the attached Appendix.

Floor covering must not make contact with any walls or joineries (kitchen benches, cupboards etc). During the installation of any hard floor coverings, temporary spaces of 5~10 mm should be used to isolate the floor covering from walls and/or joineries and the resulting gaps should be filled with a suitable mastic type sealant or off-cut of underlay or the equivalent where available. The acoustic integrity could be degraded if the above precautions and treatments are not implemented.



# APPENDIX A

## A P P E N D I X A

# APPENDIX A

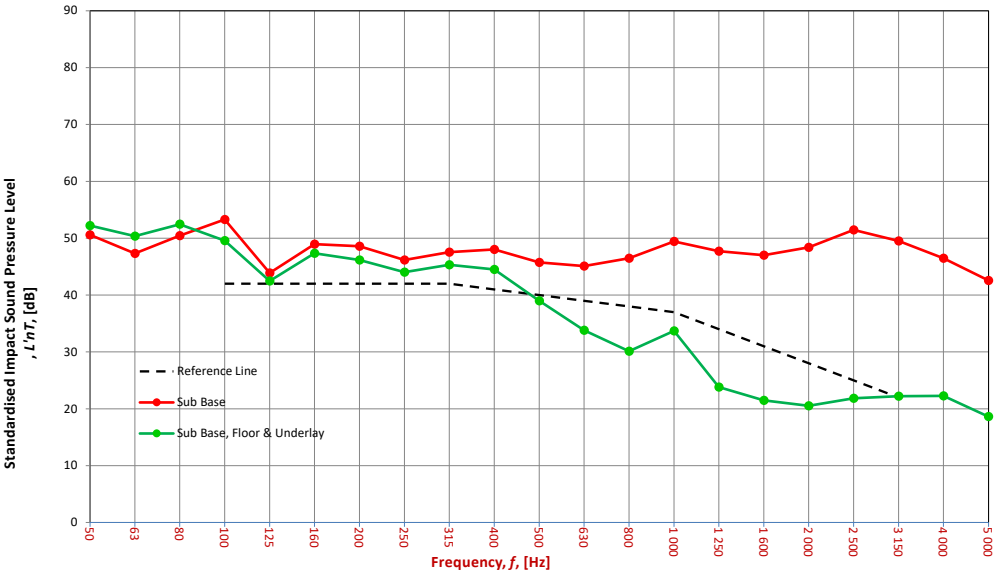
FIELD MEASUREMENTS OF IMPACT SOUND INSULATION OF FLOORS



Date of Test :	Tuesday, 4 October 2022		
Project No. :	3618		
Testing Company :	Koikas Acoustics		
Checked by :	Nick Koikas		
Place of Test:	Residential building in St Leonards		
Client	Topdeck Flooring		
Client Address	-		
Description of Floor System	Name	Thickness (mm)	Density (SI)
	Lumiere Ultra HD Hybrid Plank	7	--
	--	--	--
	Concrete	--	--
Room Dimensions	Width :	4	m
	Length :	8.4	m
	Area :	33.6	m <sup>2</sup>
Sample Dimensions	Width :	1	m
	Length :	1	m
	Area :	1	m <sup>2</sup>

Receiver Rm	Location	Width	Length	Area	Height	Volume	Room Surfaces		
							Walls	Floor	Ceiling
	Residential Unit - KDL	4	8.4	33.6	2.7	90.7	Plasterboard	Carpet/Tile	Plasterboard

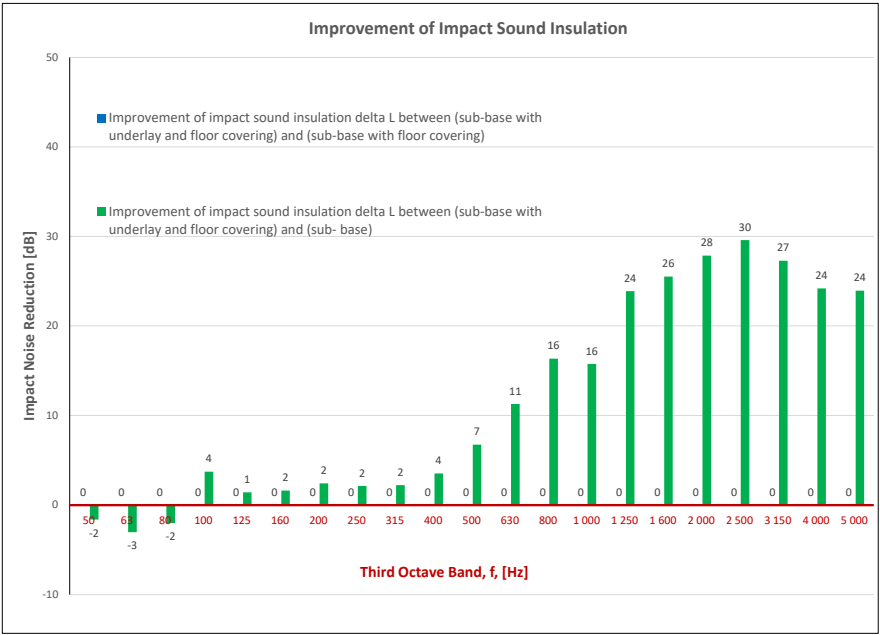
Frequency f Hz	L'nT (one-third octave) dB		
	Sub Base	Sub Base Floor	Sub Base Floor Underlay
50	50.6	N/A	52.2
63	47.3	N/A	50.4
80	50.5	N/A	52.5
100	53.3	N/A	49.6
125	43.9	N/A	42.5
160	49.0	N/A	47.4
200	48.6	N/A	46.2
250	46.2	N/A	44.0
315	47.5	N/A	45.3
400	48.0	N/A	44.5
500	45.7	N/A	39.0
630	45.1	N/A	33.8
800	46.5	N/A	30.1
1 000	49.4	N/A	33.7
1 250	47.7	N/A	23.8
1 600	47.0	N/A	21.5
2 000	48.4	N/A	20.5
2 500	51.4	N/A	21.8
3 150	49.5	N/A	22.2
4 000	46.5	N/A	22.3
5 000	42.6	N/A	18.6



Sub Base		
L'nT,w	55	AS ISO 717.2 - 2004
Ci	-10	AS ISO 717.2 - 2004
Ci(50-2500)	-9	AS ISO 717.2 - 2004
Ci(63-2000)	-10	AS ISO 717.2 - 2004
AAAC★	3 Star	AAAC Guideline
FIIC	50	ASTM E1007-14

Sub Base & Floor		
L'nT,w	N/A	AS ISO 717.2 - 2004
Ci	N/A	AS ISO 717.2 - 2004
Ci(50-2500)	N/A	AS ISO 717.2 - 2004
Ci(63-2000)	N/A	AS ISO 717.2 - 2004
AAAC★	N/A	AAAC Guideline
FIIC	N/A	ASTM E1007-14

Sub Base, Floor & Underlay		
L'nT,w	40	AS ISO 717.2 - 2004
Ci	0	AS ISO 717.2 - 2004
Ci(50-2500)	4	AS ISO 717.2 - 2004
Ci(63-2000)	3	AS ISO 717.2 - 2004
AAAC★	6 Star	AAAC Guideline
FIIC	70	ASTM E1007-14



Definitions of Noise Metrics

**FIIC:**  
Field Impact Insulation Class is a single-number rating of how well a floor system attenuates impact type sounds, such as footsteps. Calculated from third-octave band normalised impact sound pressure level data and referenced to 10 m<sup>2</sup> as described in ASTM E989. The higher the single-number rating, the better its impact insulation performance.

**L'nT,w:**  
The Weighted Standardised Impact Sound Pressure Level when measured in situ referenced to a reverberation time (RT60) of 0.5 seconds. Used by the AAAC to determine their respective Star Rating.

**Ci:**  
Spectrum adaption term is a low frequency correction factor. Typically for massive floors such as concrete, the values are about zero while for timber joist floors Ci is positive because of the low resonant frequencies. Considers frequency range between 100 -and 2500 Hz.

**Ci(50-2500):**  
Same as above, but for the frequency range 50 -2500 Hz.

**Ci(125-2000):**  
Same as above, but for the frequency range 125 -2000 Hz.

AAAC Star R.	2	3	4	5	6
L'nT,w	65	55	50	45	40
FIIC	45	55	60	65	70
Comments	Below BCA 62	Clearly Audible	Audible	Barely Inaudible	Normally Inaudible

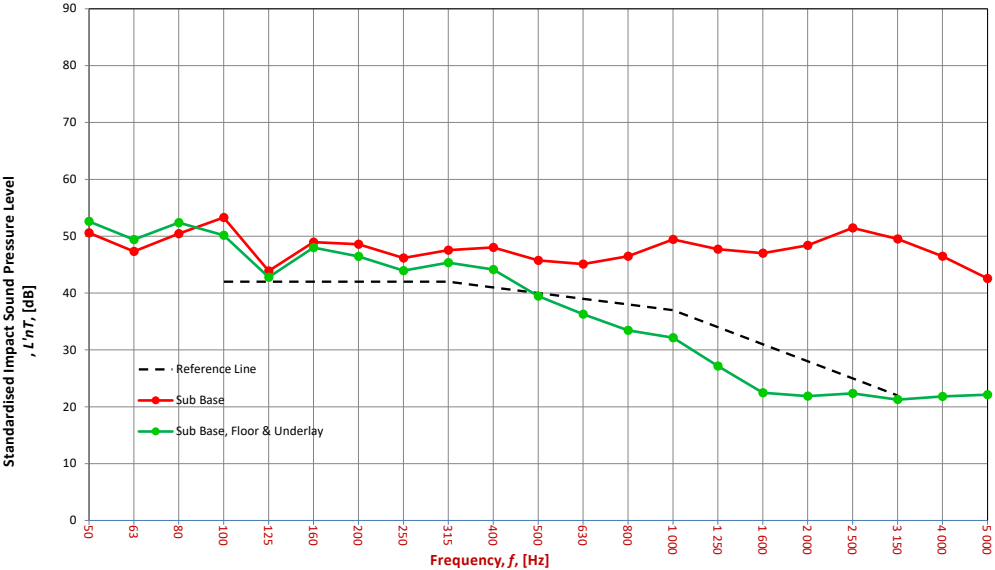
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Receiver Rm	Location	Width	Length	Area	Height	Volume	Room Surfaces		
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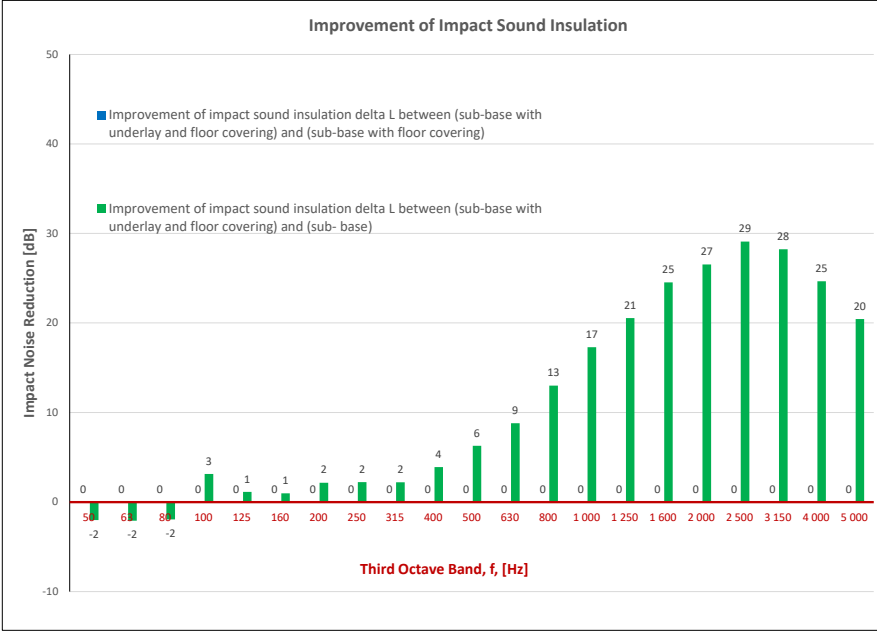
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Sub Base		
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Sub Base & Floor		
L'nT,w	N/A	AS ISO 717.2 - 2004
Ci	N/A	AS ISO 717.2 - 2004
Ci(50-2500)	N/A	AS ISO 717.2 - 2004
Ci(63-2000)	N/A	AS ISO 717.2 - 2004
AAAC★	N/A	AAAC Guideline
FIIC	N/A	ASTM E1007-14

Sub Base, Floor & Underlay		
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Ci	0	AS ISO 717.2 - 2004
Ci(50-2500)	4	AS ISO 717.2 - 2004
Ci(63-2000)	3	AS ISO 717.2 - 2004
AAAC★	6 Star	AAAC Guideline
FIIC	69	ASTM E1007-14



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