COMPARATIVE CASE STUDY PRO

Acoustic Performance of Ceramic Tiles Installations Over Concrete Slabs With Various Underlayments

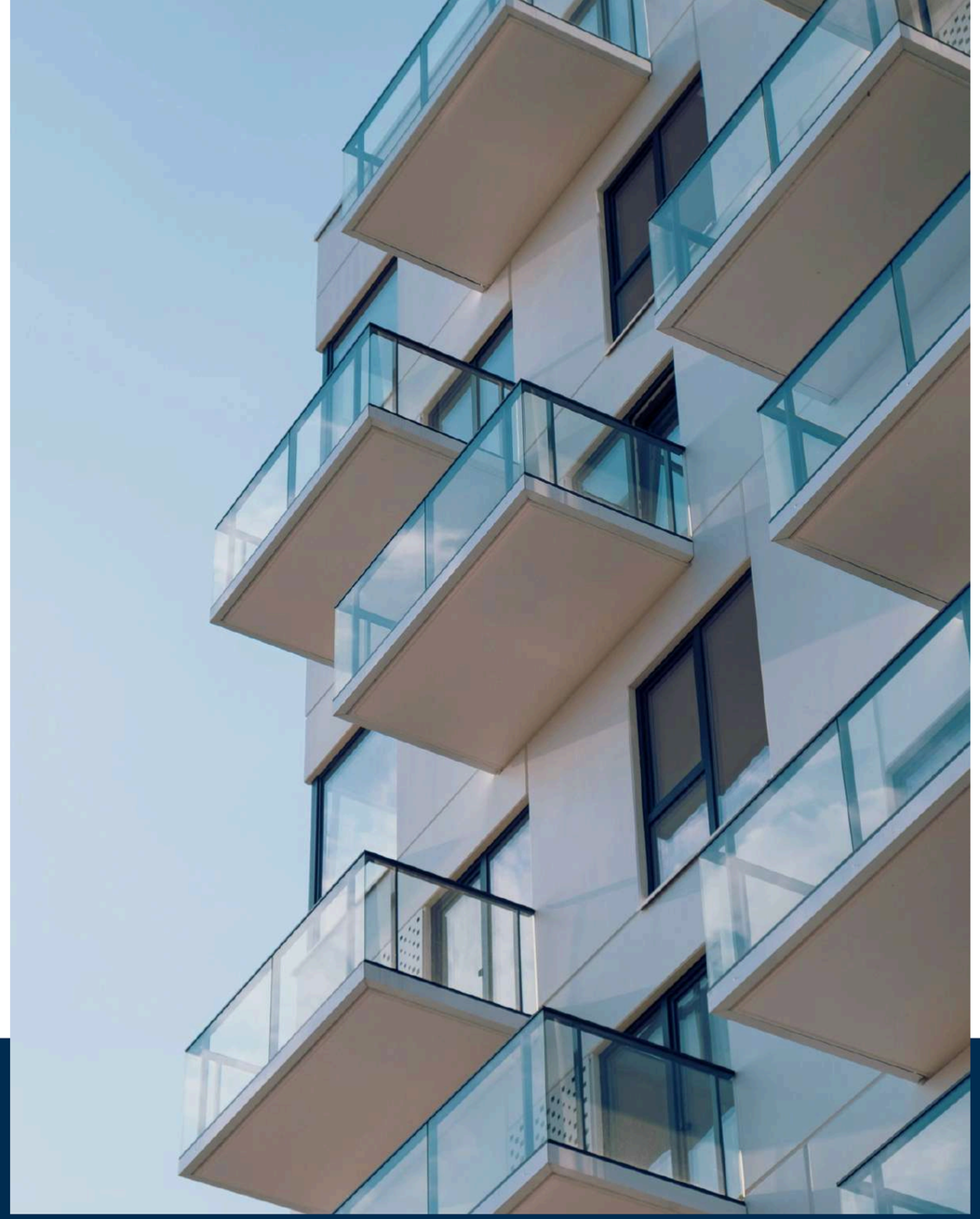
Presented by

AcoustiTECH

In Collaboration With

Sibe ACOUSTIQUE

AGENDA



INTRODUCTION

In the multi-residential construction market, sound insulation and control are critical to creating comfortable and quiet living environments. One of the most challenging scenarios is the acoustical performance of assemblies incorporating ceramic flooring, which is popular for its durability and aesthetic appeal but can pose significant challenges in managing sound transmission.

This case study delves into the acoustical frequency behaviors of various floor assemblies with ceramic tiles surfaces, focusing on their performance in the multi-residential context. Addressed to construction professionals, architects, and acoustic engineers, the study examines how different underlayment systems impact sound transmission loss and their frequency-specific behaviors. Through detailed analysis, the findings aim to provide actionable insights into designing floor assemblies that meet the stringent acoustic standards required in multi-residential buildings, without compromising on the benefits of ceramic flooring.

OUR APPROACH

Before delving deeper into the analysis, it is important to note that AcoustiTECH, serving as a **brokering expert** in acoustics, plays a unique role in this case study. AcoustiTECH has access to all the technologies and systems discussed here, including AcoustiTECH's own systems and those from other manufacturers, such as Fermacell and Sonomax. This access allows AcoustiTECH to provide an **unbiased, neutral evaluation** of the various acoustic assemblies tested.

AcoustiTECH sought to compare different solutions that could meet the client's objectives, benchmarking them against well-known and popular products in the market to achieve the most comprehensive comparative study possible.

Because AcoustiTECH is not bound to any single solution, their **presentation and interpretation of the data are based purely on performance metrics** rather than brand loyalty. This impartiality ensures that the results are transparent and objective, allowing professionals to make informed decisions about which flooring systems best meet the acoustic requirements for multi-residential buildings.

CONTEXT

Now, to put you in context, the client, a new high-end condo owner, expressed a strong preference for installing ceramic flooring throughout the entirety of his unit. While ceramic has its advantages in terms of look and durability, its acoustic properties raised concerns among the building's decision-makers. In a multi-residential context, where noise transmission between units is a primary concern, the performance of ceramic flooring compared to standard floating flooring—known for its superior sound attenuation—was called into question.

Although the building management was not opposed to the idea of ceramic flooring, they required evidence that this material could meet or exceed the acoustic performance of traditional floating floors, particularly in controlling impact noise. The challenge was to demonstrate that the ceramic flooring assembly, with the right combination of underlayment, could achieve similar or better results in mitigating noise transmission between units. As part of this requirement, the client was tasked with providing data that could verify the acoustic efficacy of ceramic flooring assemblies in such environments.

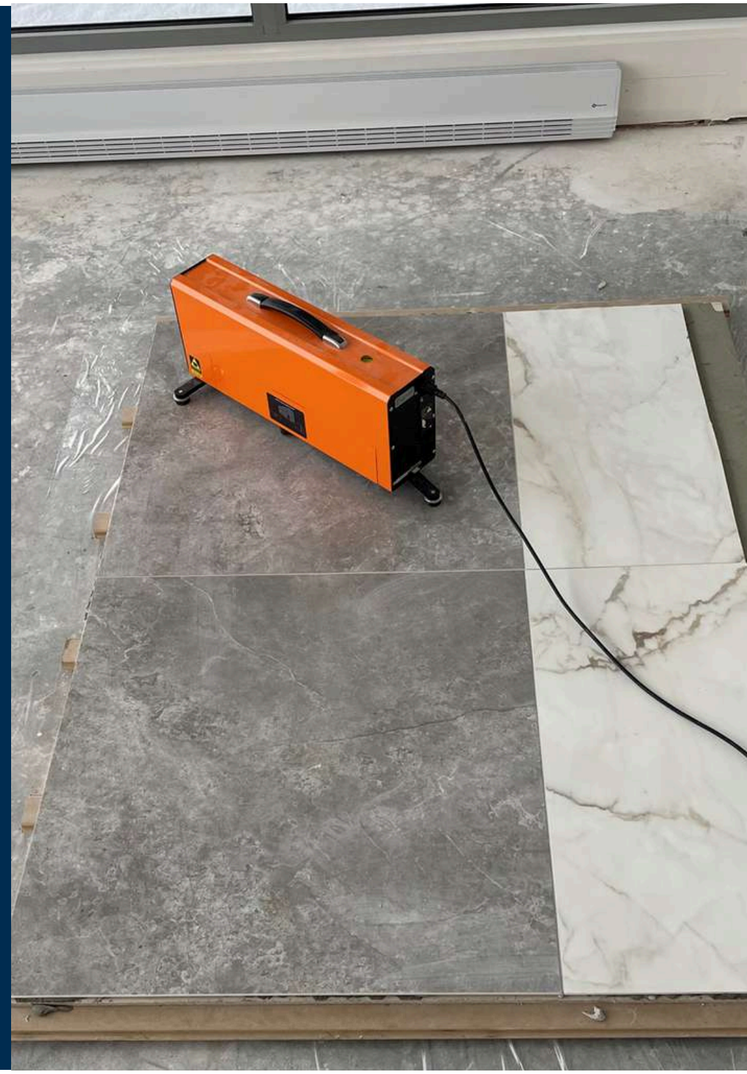
OBJECTIVES

1. Meet acoustic standards set by building management.
2. Provide concrete evidence of ceramic flooring performance.
3. Demonstrate comparable or superior results to floating flooring.
4. Facilitate decision-making with reliable data.

CONTEXT

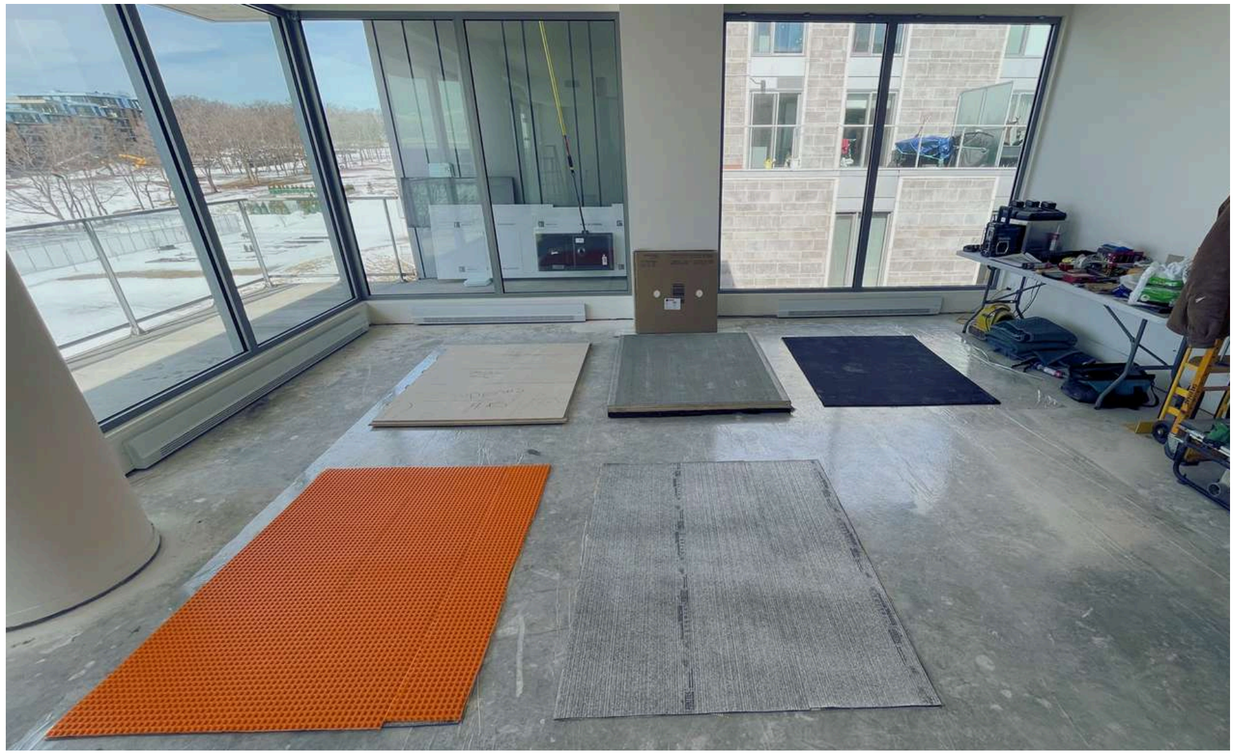
To address the concerns and provide concrete evidence, acoustic performance measurements were conducted on side-by-side flooring installations in the same room. The tests were designed to ensure consistency, with all variables controlled. The same engineer oversaw each installation to maintain precision in the methodology. Additionally, identical ceramic tiles were used across all flooring assemblies to isolate the effect of the underlying acoustical assemblies.

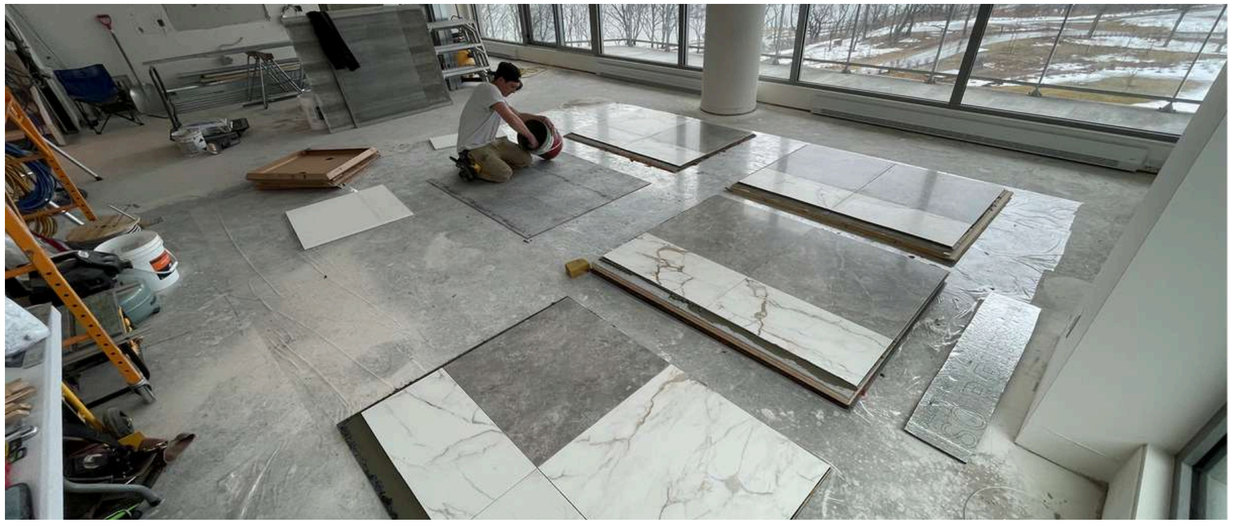
Each floor assembly was installed following the exact same conditions, with one setup incorporating the requested ceramic flooring and another featuring standard floating flooring with underlayment. By conducting these tests in a controlled environment, any differences in acoustical performance could be directly attributed to the characteristics of the flooring systems rather than external variables. This approach provided a reliable comparison, giving the decision-makers a clear understanding of how the ceramic flooring performed in terms of sound transmission loss and impact noise reduction, as compared to the floating floor system typically preferred for multi-residential buildings.



ACOUSTIC TESTING IN ACTION

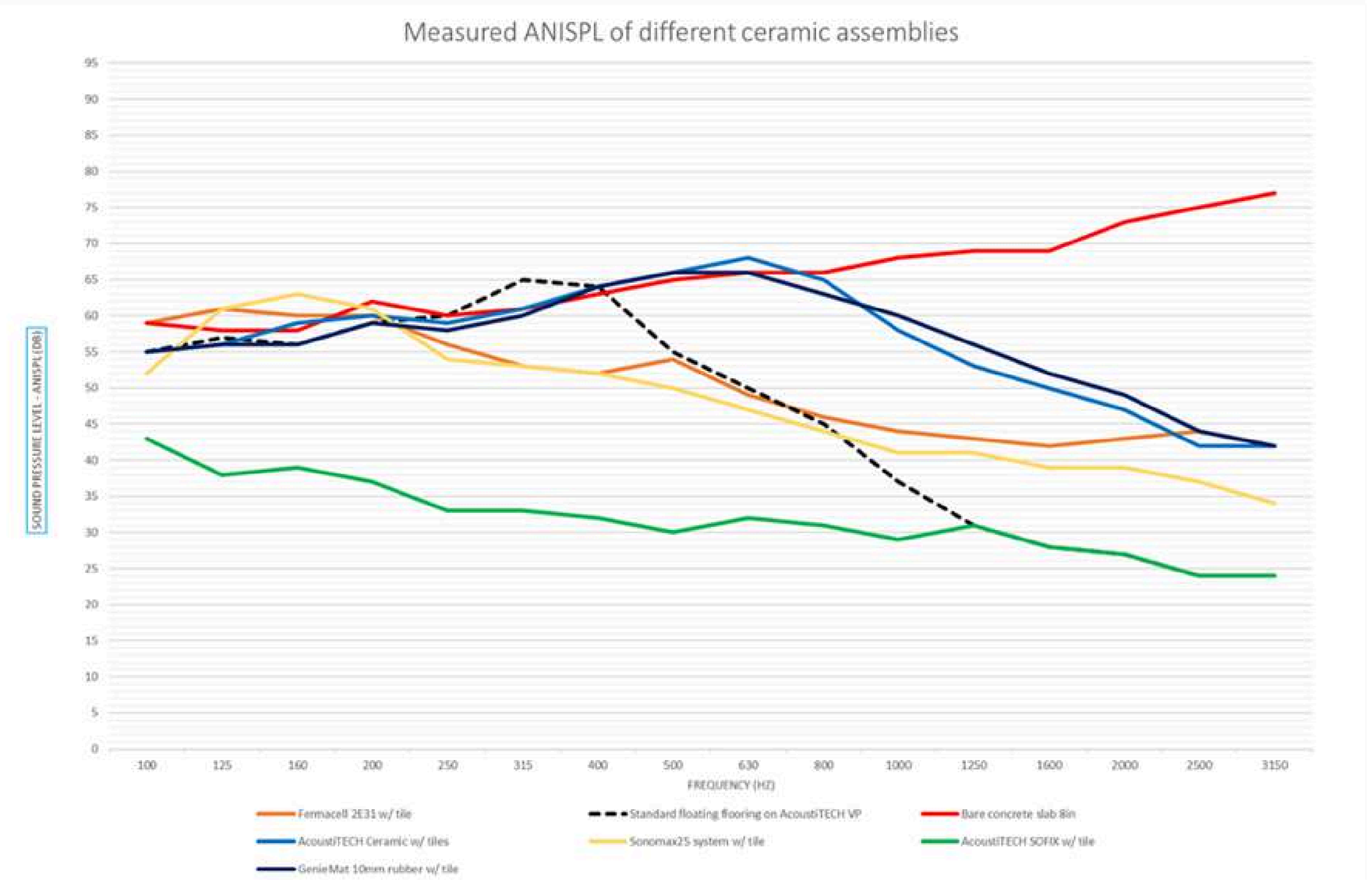
FROM CONTROLLED SETUP TO COMPARATIVE RESULTS





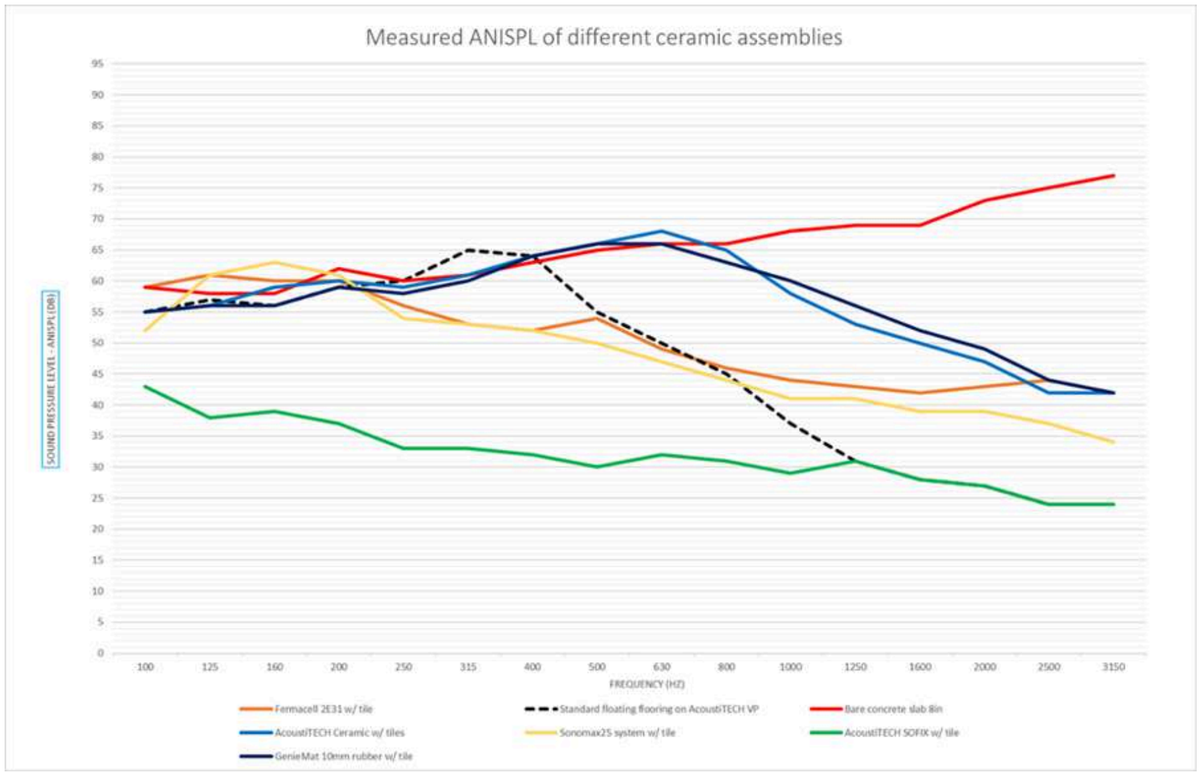
Left: Different underlayments options laid out in a controlled environment , Top Right: Overview of the testing setup, with technicians ensuring precise installation Top Left: Acoustic testing of the different underlayments

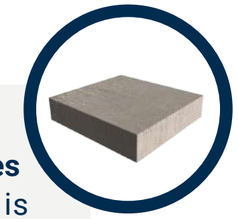
RESULTS


Measured ANISPL of different ceramic assemblies
SOUND PRESSURE LEVEL - ANISPL (DB)
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
100
125
160
200
250
315
400
500
630
800
1000
1250
1600
2000
2500
3150
FREQUENCY (HZ)
Fermacell 2E31 w/ tile
Standard floating flooring on AcoustiTECH VP
Bare concrete slab 8in
AcoustiTECH Ceramic w/ tiles
Sonomax25 system w/ tile
AcoustiTECH SOFIX w/ tile
GenieMat 10mm rubber w/ tile

RESULTS

Let’s go over the performance of each assembly based on the curves shown





1. BARE CONCRETE SLAB (8IN) – RED LINE:

- The bare concrete slab consistently shows the **highest ANISPL values across all frequencies**, indicating poor impact sound insulation. This is expected for bare concrete, as it typically does not provide effective sound dampening, especially at high frequencies.

- From 100 Hz to around 1000 Hz, the ANISPL gradually increases, peaking near 3150 Hz, where it reaches about 73-75 dB. This demonstrates a significant challenge in managing high frequencies.

AIIC : 21 , NISR : 29 , AHIR : 26

2. STANDARD FLOATING FLOORING ON ACOUSTITECH VP – BLACK DASHED LINE:

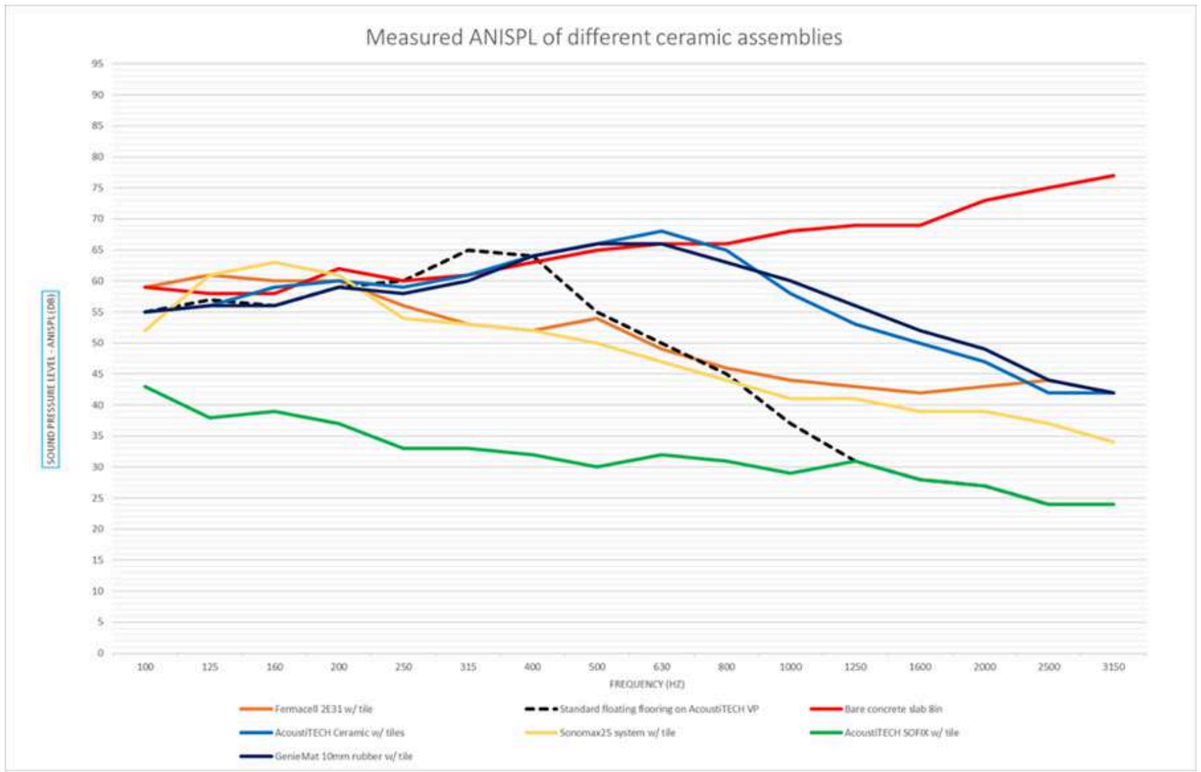
- This assembly shows better performance than the bare concrete slab, particularly in the mid to high-frequency range (500 Hz and above), where the ANISPL drops significantly. The floating flooring manages to reduce the sound pressure levels to about 24 dB around 2500 Hz.

- However, it lack performance in the low-to-mid-frequency spectrum, peaking 65 dB at 315 Hz. This suggests that while it can manage higher frequency sounds better, it is less effective at dampening low-frequency impact sounds such as heavy footfalls or hard impact noise.

THICKNESS : 2,2 MM - AIIC : 55, NISR : 61 , AHIR : 60

RESULTS

Let’s go over the performance of each assembly based on the curves shown



3. ACOUSTITECH CERAMIC WITH TILES – BLUE LINE:

- The synthetic needle-punched membrane with tiles shows decent performance across all frequency ranges. It performs similarly to the standard floating flooring in the low and mid frequencies but is outperformed in high frequencies.

THICKNESS : 3MM , AIIC : 49 , NISR : 55 , AHIR : 48

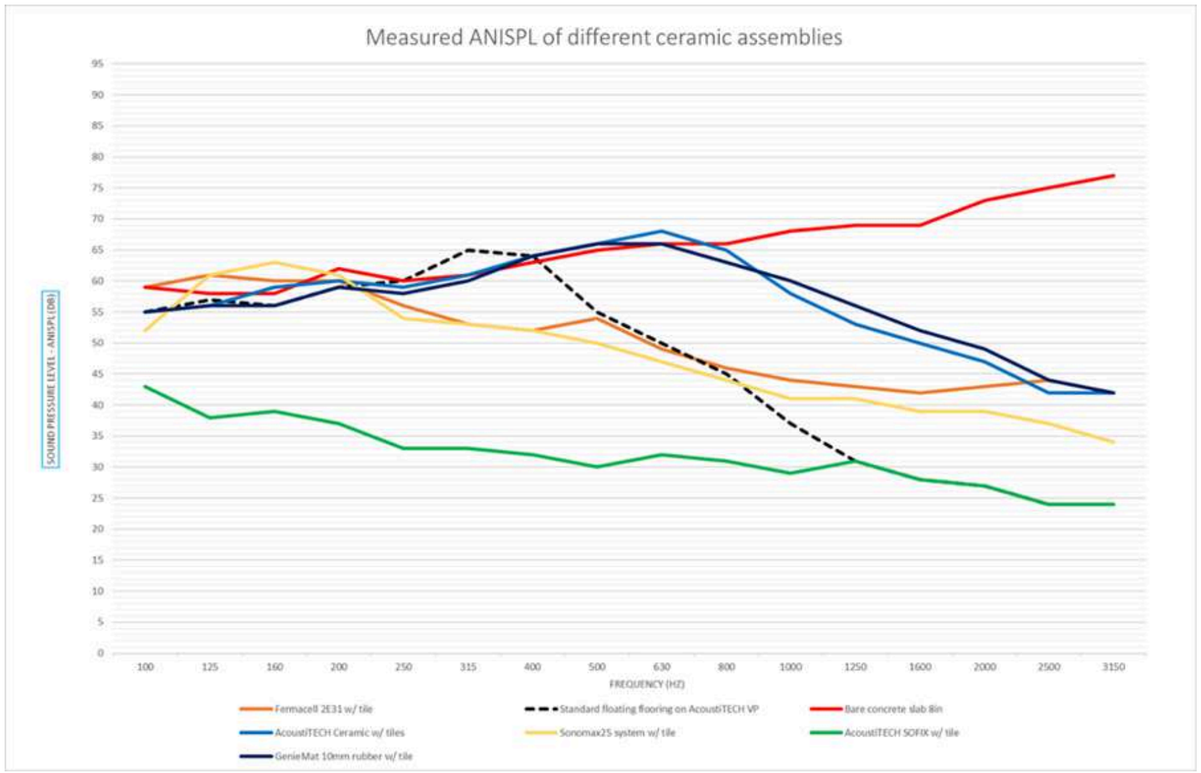
4. 10MM RUBBER WITH TILES – DARK BLUE LINE:

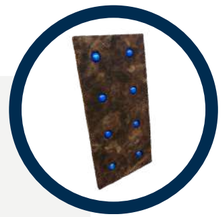
- While being 7mm thicker, this assembly provides very comparable performance in both low and high frequencies to the needle-punched ceramic underlayment. In the low-frequency range, both ANISPL’s starts to drop significantly after 630 Hz, reaching about 42 dB at higher frequency. This indicates that these systems are relatively effective at insulating against mid to high impact sounds.

THICKNESS : 10 MM, AIIC : 50, NISR : 56 , AHIR : 48

RESULTS

Let’s go over the performance of each assembly based on the curves shown





5. ACOUSTITECH SOFIX WITH TILES – GREEN LINE:

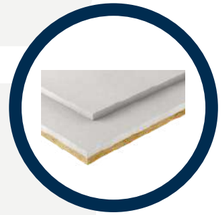
- The AcoustiTECH SOFIX assembly is the **best performer across all frequencies**, maintaining the lowest ANISPL values consistently.
- These value remains low even at low frequencies (below 400 Hz), where other systems struggle. It stays between 43-24 dB, offering exceptional performance in controlling low-frequency impact sound.

THICKNESS : 76 MM, AIIC : 75, NISR : 81 , AHIR : 75

6. SONOMAX25 SYSTEM WITH TILES – YELLOW LINE:

- The Sonomax25 system shows good comparative performance, with relatively low ANISPL values starting at 250 Hz where the sound pressure levels steadily decreases, reaching around 34 dB in higher frequencies.

THICKNESS : 25 MM, AIIC : 57, NISR : 63 , AHIR : 62



7. FERMACELL 2E31 WITH TILES – ORANGE LINE:

- The Fermacell system offers similar performance to the Sonomax25. However, it shows slightly **worst control of mid to high frequency impact sounds** than Sonomax25.

THICKNESS : 30 MM, AIIC : 56, NISR : 62 , AHIR : 57

CONCLUSION

BEST OVERALL PERFORMANCE	**AcoustiTECH SOFIX (green line)** exhibits the most consistent and lowest ANISPL values, particularly effective at reducing impact noise across all frequencies.
STRONG ALTERNATIVES	The **Fermacell (orange line)** and the **Sonomax25 (yellow line)** systems offer strong performance, especially in mid to high frequencies, and are a viable alternative if the AcoustiTECH SOFIX system is not an option.
ADEQUATE PERFORMERS	**AcoustiTECH Ceramic (yellow line)** and **10mm Rubber (dark blue line)** also offer good alternatives with acceptable insulation properties in both mid and high frequencies.

SUMMARY

01

Goal

Prove that ceramic flooring can achieve high acoustic performance in multi-residential buildings.

02

Solution

Tested various underlayment systems, including AcoustiTECH SOFIX, to compare sound insulation performance.

03

Impact

Provided clear evidence that ceramic flooring can be installed in demanding multi-residential settings while meeting acoustic standards, using the appropriate system.

THE RIGHT PRODUCT AT THE RIGHT PLACE

When selecting a membrane for a building renovation or construction, it is important to consider several factors such as the structure of the building, the choice of floor covering and the type of installation. It is essential to look beyond an acoustic result displayed on a product. Acoustic comfort is much more than a number.

PRO

Email

Password

Forgot your password?

Log in

Generate PDF

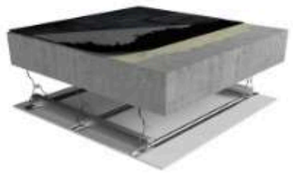
Keywords Search

STRUCTURE

- ☐ Concrete
- ☐ Light wood
- ☐ Mass timber
- ☐ Steel

ASSEMBLY COMPONENTS

- ☐ Acoustiboard (Soprema)
- ☐ AcoustiTECH 3500
- ☐ AcoustiTECH 5000
- ☐ AcoustiTECH 7000
- ☐ AcoustiTECH Ceramic
- ☐ AcoustiTECH Lead 3.3
- ☐ AcoustiTECH Lead 4.5
- ☐ AcoustiTECH Lead 6
- ☐ AcoustiTECH LV
- ☐ AcoustiTECH SOFIX
- ☐ AcoustiTECH VP



CON-KD9 | CERAMIC | MORTAR | SOPRAWAY NG2 (SOPREMA) | GLUED | CONCRETE | FURRING STRIPS | CEILING

Acoustic performance
AIIC: 55 to 62
ASTC: 65 to 70

More details

CON-XV3 | CERAMIC | MORTAR | SOPRAWAY NG2 (SOPREMA) | GLUED | CONCRETE

Acoustic performance
AIIC: 48 to 54
ASTC: 57 to 62

More details

CON-O2N | CERAMIC | MORTAR | ACOUSTITECH CERAMIC | GLUED | CONCRETE

Acoustic performance
AIIC: 50 to 56
ASTC: 57 to 62

More details

Explore the AcoustiINDEX, your interactive database for configuring the right acoustic assembly. Scan the QR code to explore the platform!

Need detailed acoustic data and reports? Contact us directly for in-depth insights and precise performance metrics.

AcoustiINDEX

service@acousti-tech.com
1-888-838-4449

Ready to Elevate Your Project?

Contact Us

Email

service@acousti-tech.com

Social Media

AcoustiTECH

Acoustitech, solutions acoustiques pour bâtiments

acousti_tech

Call us

1-888-838-4449