

LABORATORY ACOUSTIC TEST

REPORT



Industrialdea Zona A. Pab 35.
Asteasu E-20159, Gipuzkoa

Horizontal enclosure: 14 cm concrete reference slab + Rigi 60 Profiles on AFB 60 Floor Block + 18 mm OSB III board + 9 cm concrete screed + Flemish planking composed of a supporting structure braced with mineral wool + double 22 mm DM board + double 2 mm bituminous sheet + 30 mm MDF board + 14 mm three-layer wood with oak finish.

Ref: CAM24020013/MEJ_IMP

Date of issue:

February 26, 2024



TEST REPORT

TEST LOCATION

Place of test

STANDARDIZED TEST CHAMBERS OF

**AUDIOTEC. C/JUANELO TURRIANO, 4. BOECILLO
TECHNOLOGY PARK
(VALLADOLID) SPAIN**

TEST

Laboratory measurement of noise reduction of
transmitted through floor coverings on heavy
normalized slabs.

SAMPLE

Supporting enclosure: 14 cm concrete reference slab
Covering: Rigi 60 Profiles on AFB 60 Floor Block + 18 mm OSB III
board + 9 cm concrete screed + Flemish planking composed of a
supporting structure braced with mineral wool + double 22 mm DM
board + double 2 mm bituminous sheet + 30 mm MDF board + 14
mm three-layer wood with oak finish.

*Note: 48 mm thick mineral wool between profiles and additionally
installed on the perimeter of the system.*

TEST METHOD

**UNE EN ISO 10140-1:2022. Annex H
UNE EN ISO 10140-3:2022**

Customer

AMC Mekanocaucho
Industrialdea Zone A. Hall 35.
Asteasu E-20159, Gipuzkoa

TEST DATE:

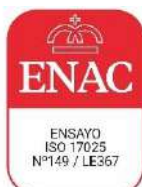
April 5, 2023

Technician

Reviewed

Signed: Jairo González Nieto
Laboratory technician

Signed: Ángel Arenaz Gombau
Laboratory Technical Director



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1.- TEST OBJECT

Evaluation of the reduction of impact noise transmitted through floor coverings on a heavy normalized slab of 140 mm, ΔL_w , of the following sample:

Identification of the construction system: Horizontal system composed of:

- **Supporting enclosure:** 14 cm concrete reference slab
- **Covering:** Rigi 60 Profiles on AFB 60 Floor Block + 18 mm OSB III board + 9 cm concrete screed + Flemish planking composed of a supporting structure braced with mineral wool + double 22 mm DM board + double 2 mm bituminous sheet + 30 mm MDF board + 14 mm three-layer wood with oak finish.

Due to its characteristics, the floor covering is categorized into Category II as indicated in section H.2.2.2 of Annex H of the UNE EN ISO 10140-1:2022 standard.

The test was carried out in AUDIOTEC's standardized chambers in the Boecillo Technology Park (Valladolid).

2.- TEST PROCEDURE

2.1- Procedures and Standards used

The test has been carried out taking into account the following laboratory standards and procedures:

- *UNE-EN ISO 10140-3:2022. Acoustics. Laboratory measurement of impact sound insulation.*
- *Annex H of the UNE-EN ISO 10140-1:2022 standard (Floor coverings. Improvement of impact noise insulation).*
- *Annex C of the UNE-EN ISO 10140-5:2022 standard (Normalized floors to measure the improvement in acoustic insulation against impact noise through floor coverings).*
- *Measurement procedures and calculations set out in the specific test procedures PE-37 and PE-39 of the AUDIOTEC Acoustics Laboratory.*

2.2- Methodology and test parameters

The chambers where the test was carried out comply with the regulations and requirements established in the UNE EN ISO 10140-5:2022 Standard. They are vertically adjacent chambers. One of them, the lower or receiving one, is fixed and sits under the floor level. The other one, the upper one or source chamber (chamber where the impact machine is located), is mobile and is placed on the slab at test. Both have the shape of irregular 6-faced prisms without parallel corners. The walls of the receiving chamber are 30 cm concrete walls and inner acoustic claddings covered with 15 mm plasterboard. It's volume is 52,8 m³. Upper chamber's walls are made of a 15 cm sandwich metal structure on the outside, reinforced with acoustic insulating and absorbing materials and an inside acoustic cladding.

Two tests were carried out, the first the reference slab and then the complete system, that is, with the carrier system plus the coating. The methodology is described below:

For each of the tests, a standardized impact machine was successively placed in five positions distributed over the surface under test.

In the case of the complete system, 3 discrete measurements with a frequency analyzer lasting 6 seconds were carried out for each position of the impact machine. The microphone kept at all times a minimum distance of 0.7 m from the side walls and at least 1 m from the sample under test.

In the testing of the carrier system, 3 discrete measurements with a frequency analyzer lasting 6 seconds were carried out for each position of the impact machine. The microphone kept at all times a minimum distance of 0.7 m from the side walls and at least 1 m from the sample under test. Same as for the complete system.

The measurements were made in each of the third-octave bands between 100 and 5000 Hz.

Afterwards, with the impact machine stopped, the background noise level in the receiving chamber was measured. For the complete system test, this measurement was performed with 3 discrete measurements with a frequency analyzer, lasting 6 seconds, for both the carrier system and the complete system.

Finally, the reverberation time in the receiving chamber was measured. For this, 2 source positions were used in the receiving chamber separated by more than 3 m. For each source position, 3 microphone positions in the receiving chamber were used to measure reverberation. All of them were more than 1 m from the side walls, at least 1.8 m between them and 2 m from the sound source. 2 measurements were taken in each position and the respective averages were obtained. TR20 was measured.

2.3.- Instrumentation used

The instrumentation used in the test was:

- Brüel & Kjaer standardized impact machine, type 3207-001 with serial number 2372848.
- Brüel & Kjaer noise source type 4292, with serial number 004007.
- PULSE analyzer model B&K 3560-B-030 with serial number 2538701.
- PHONIC MAX 860 amplifier with serial number ABA2GBA171.
- BEHRINGER third octave equalizer model DEQ2496.
- B&K 4189 microphone with serial number 2534182 and B&K 2669 preamplifier with serial number 2532870.
- Brüel&Kjaer spectrum analyzer type 2260, class 1, with serial number 2497415, previously verified. This analyzer has built-in filters in frequency bands.
- Brüel&Kjaer spectrum analyzer type 2270, class 1, with serial number 3024325, previously verified. This analyzer has built-in filters in frequency bands.
- B&K type 4231 calibrator-verifier, class 1, with serial number 2136530.
- BARIGO thermoanemometer, model no. 525.

2.4.- Identification of the products and description of the sample

PRODUCT	DIMENSIONS	BRAND/MODEL	PROPERTIES ESSENTIALS	
Reinforced concrete reference slab (Supporting enclosure)	400x440cm	--	surface mass	351kg/ m ²
			Surface	17.6 m ²
floor stands	--	AFB 60 Floor Block	Maximum load	60kg

PRODUCT	DIMENSIONS	BRAND/MODEL	PROPERTIES	
			ESSENTIALS	
Sylomer	--	SR11	Thickness	12mm
		SR55	Thickness	25 mm
Profiles	60x28mm	Placo Rigi 60	--	--
Mineral wool	--	--	Thickness	48 mm
OSB III board	--	--	Thickness	18 mm
Concrete screed	--	--	Thickness	90 mm
MDF boards	--	--	Thickness	22 y 30 mm
Double bituminous sheet	--	--	Thickness	2 mm
three-layer wood with oak finish	--	--	Thickness	14 mm
Screws	--	--	--	--
Silicone	--	--	--	--
Immediate tack adhesive	--	--	--	--

Sample sketch:

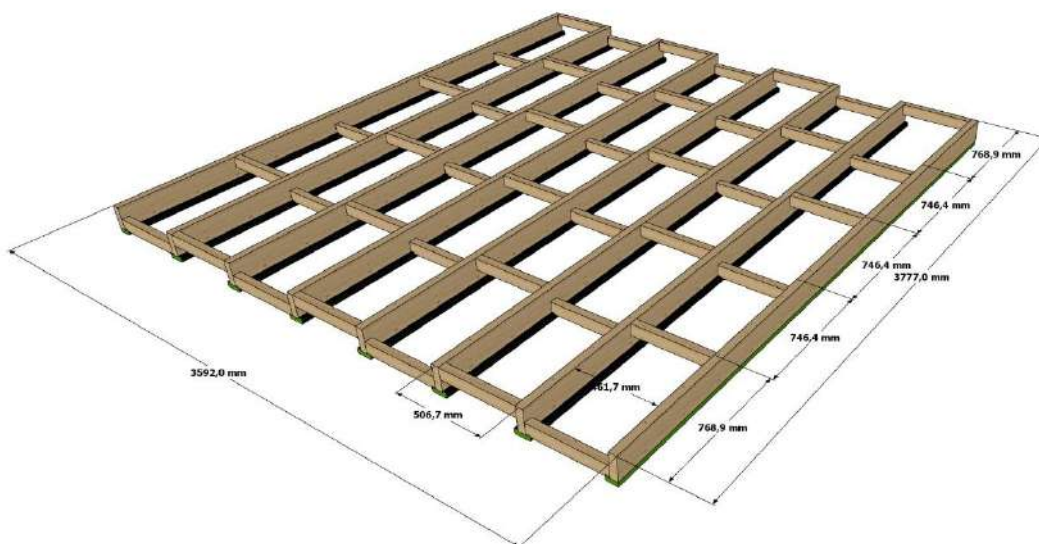


Figure 2.4.1

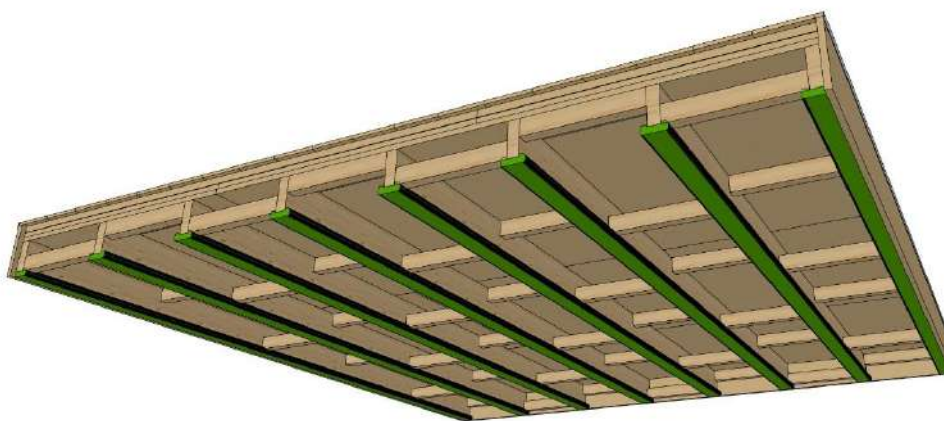


Figure 2.4.2

2.5.- Sample installation process

In the gap between the transmitting and receiving chambers, the standard 14 cm thick reinforced concrete reference slab was placed.

First, the AFB 60 Floor Blocks were placed inside the Rigi 60 profiles, spaced 524 mm between centers and the profiles were placed on the concrete slab, spaced 578 mm between centers. Next, the 48 mm thick mineral wool was placed in the spaces between the profiles.

Once the support structure was in place, a strip of Sylomer SR11 was placed on the perimeter and an 18 mm thick OSB III board was installed on the structure without screwing. The joints of the board were sealed and a plastic sheet (polyethylene) was placed to prevent moisture from entering the board. Next, the 9 cm concrete screed was made and left to dry for several weeks.

The base of the “tablao” was installed on top of the concrete screed. Prior to its installation, the SR55 sylomer strips were glued to its base, in the form of figure 2.4.1. The base was previously assembled and braced, being installed in a modular way in the chamber. Rock wool was inserted between the gaps in the supporting structure. Next, two 22 mm MDF boards were superimposed, screwed to the supporting structure, and a double bituminous layer 2 mm thick was placed on top of them, for a total of 4 mm. This layer is fixed by gravity, by placing another 30 mm thick DM board on it. Finally, the 14 mm three-layer wood sheets with an oak finish are installed, tongued and grooved together, screwed to the lower MDF board without drilling the acoustic sheet.

2.6.- Characteristics and test conditions

The approximate nominal thickness of the system: 561 mm: 140 mm of the carrier + 163 mm of the system that supports the plank (Blocks + profile 55 mm, OSB III 18 mm, concrete screed 90 mm) + flamenco plank of 258 mm (Sylomer SR55 of 21 mm + 145 mm of the joist structure + double 22 mm MDF board + 4 mm bituminous sheet + 30 mm MDF board + 14 mm three-layer wood with oak finish).

The approximate surface mass of the system is 676.17 kg/m² (351 kg/m² of the reference slab + 11 kg/m² of the deck + 225 kg/m² of the screed + 12.75 kg/m² of the base of the plank + 63.72 kg/m² of the 3 MDF boards + 6.7 kg/m² of the three-layer wood + 6.00 kg/m² of the bituminous sheet).

The dimensions of the measurement opening are 3.3 m wide by 3.675 m long. The common surface between the two chambers is 12.12 m².

The approximate total area of the sample is 13.80 m².

The tested sample was installed by operators subcontracted by AUDIOTEC.

The volume of the upper chamber is 58.35 m³ and that of the receiving or lower chamber is 52.83 m³.

Environmental conditions (reference slab):

	Temperature (°C)		RH (%)		Atmospheric pressure (mba)	
Chamber	Initial	Final	Initial	Final	Initial	Final
Emitting	18.5	18.5	42	42	1025	1025
Receiver	18.0	18.0	44	44		

Environmental conditions (full system test):

	Temperature (°C)		RH (%)		Atmospheric pressure (mba)	
Chamber	Initial	Final	Initial	Final	Initial	Final
Emitting	18.4	18.4	41	41	1023	1023
Receiver	18.1	18.1	42	42		

2.7.- Photographs of the assembly





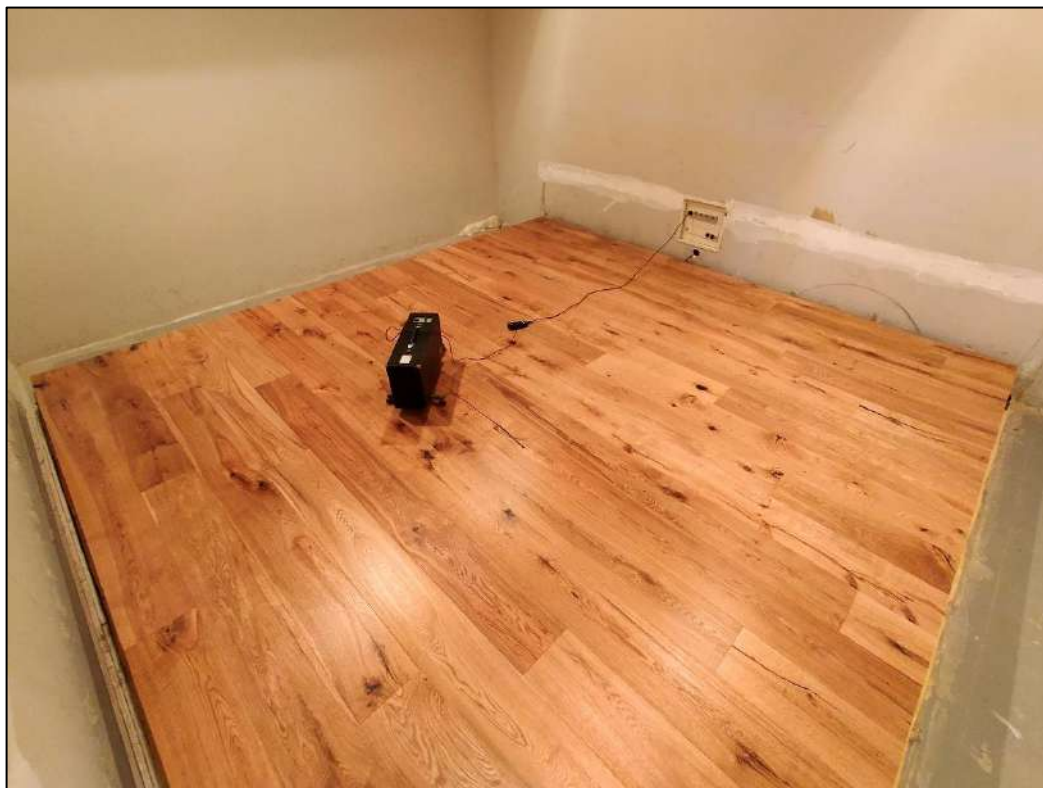












3.- TEST RESULTS

For the tested system, a page is presented which includes, among other data:

- A brief description of the tested sample.
- A table and a graph with the values of the reduction in the impact noise pressure level due to the floor covering under test as a function of the frequency, ΔL .
- A table with the normalized impact noise pressure level of the heavy floor used in the test, as a function of the frequency, L_{n0} .
- A global value of the weighted reduction in the impact noise pressure level, ΔL_w , as well as the global value of L_{nwr} and L_{nw0} , calculated according to the UNE EN ISO 717-2 standard (last version).

Notes:

- ♦ The results of this test only concern the objects presented for testing and the time and conditions in which the measurements were made.
- ♦ The measurement uncertainty is available to the client in the AUDIOTEC Acoustics Laboratory.
- ♦ This report must not be reproduced by any means unless it is done in its entirety and with the authorization of the AUDIOTEC SA Acoustics Laboratory.

Client: AMC Mecanocaucho

Sample identification:

Supporting enclosure: 14 cm concrete reference slab

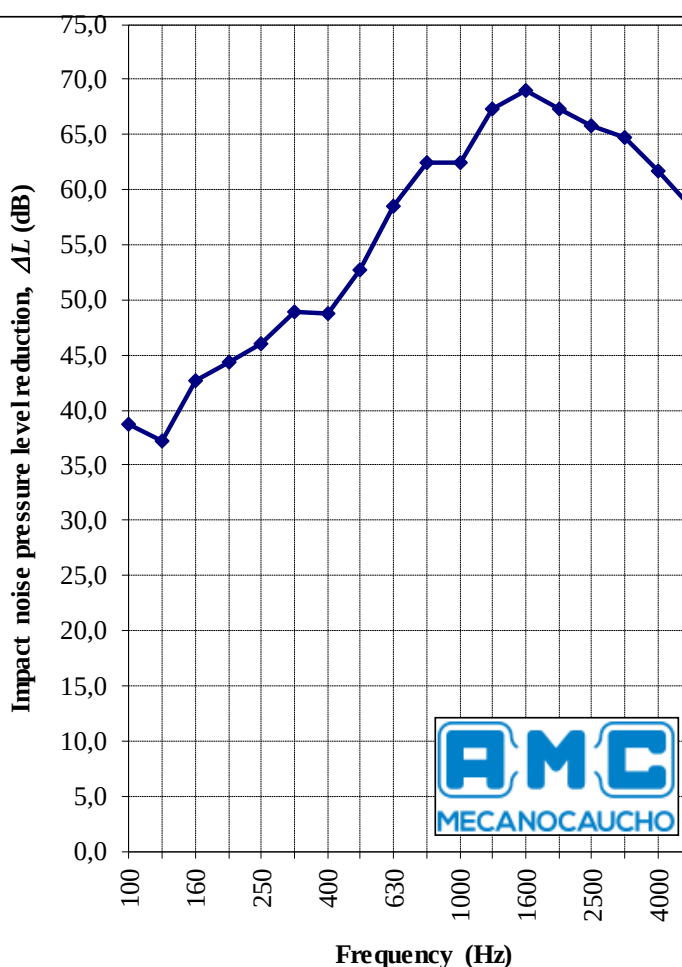
Covering: Rigi 60 Profiles on AFB 60 Floor Block + 18 mm OSB III board + 9 cm concrete screed + Flemish planking composed of a supporting structure braced with mineral wool + double 22mm DM board + double 2 mm bituminous sheet + 30 mm MDF board + 14 mm three-layer wood with oak finish.

Note: 48 mm thick mineral wool between profiles. Sylomer SR-11/12 installed on the perimeter of the base system.

Test method: UNE-EN ISO 10140-1, Anexo H. Cat. II

Thickness: 561 mm; **Superficial mass:** 676,17 kg/m²

Frec. <i>f</i> Hz	<i>L</i> _{n,0} dB	ΔL dB
100	59,2	38,8
125	59,4	37,2
160	59,8	42,7
200	61,3	44,3
250	64,5	46,0
315	70,0	48,9
400	69,3	48,8
500	71,1	52,7
630	72,0	58,5
800	70,7	62,4
1000	69,8	62,4
1250	68,5	67,4
1600	69,1	69,0
2000	67,8	67,3
2500	67,5	65,8
3150	67,8	64,7
4000	66,5	61,7
5000	65,2	58,3



Weighted reduction of the sound pressure level of impacts according to ISO 717-2 Standard

$\Delta L_w = 58$ dB

CIA = -11 dB

$L_{n,w,r} = 20$ dB

CI_r = 0 dB

$L_{n,w,0} = 74$ dB

CI₀ = -9 dB



Test date:

April 5, 2023

Technician:

Signed: Jairo González

Reviewed by:

Signed: Ángel Arenaz



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