Audiotec
INGENIERÍA ACÚSTICA

LABORATORY ACOUSTIC TEST REPORT

AMC
MECANOCAUCHO

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

System: Concrete reference slab, 14 cm + **AMC BASE** flooring system

Ref: CAM21120075-1/MEJ_IMP

Date of issue:
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TEST REPORT

TEST LOCATION	**CÁMARAS DE ENSAYO NORMALIZADAS DE AUDIOTEC. C/JUANELO TURRIANO, 4. PARQUE TECNOLÓGICO DE BOECILLO. BOECILLO. (VALLADOLID) ESPAÑA**
TEST	Laboratory measurement of the improvement of impact sound insulation of a floor covering on a standardized heavy slab.
SAMPLE	**Supporting enclosure:** Concrete slab, 14 cm **Covering:** AMC BASE flooring system, consisting of: Rigi 60 profiles on AFB 60 Floor Block + Sylomer SR-28/12 + OSB III board, 18 mm + Tabiabsorber 5 + OSB III board, 18 mm + Acoustic Floor Getzner Mat 29 + Gym floor 10 mm (rubber tiles 1x1 m) *Note: 48 mm mineral wool between profiles, SR-11/12 installed in the perimeter of the system*
TEST METHOD	**UNE EN ISO 10140-1:2016. Annex H** **UNE EN ISO 10140-3:2011**
CUSTOMER	**AMC Mecanocaucho** Industrialdea Zona A. Pab 35. Asteasu E-20159, Gipuzkoa
TEST DATE:	**February 11 & April 6, 2022**

Technician

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Nombre de reconocimiento (DN): c=ES, serialNumber=IDCES-44915713W, givenName=MARCOS, sn=MERILLAS FERNANDEZ, cn=MERILLAS FERNANDEZ MARCOS - 44915713W
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Signed: Marcos Merillas Fernández
Laboratory Technician

Reviewed

Firmado digitalmente por ARENAZ GOMBAU ANGEL MARIA - 11954820H
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Signed: Ángel Arenaz Gombau
Laboratory Technical Director

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1.- TEST OBJECT

Evaluation in standardized test rooms of the impact sound reduction, **ΔL_w,** transmitted through a floor covering over a heavy standardized slab of 140 mm.

Construction system identification: Horizontal enclosure consisting of:

- **Supporting enclosure:** Concrete slab, 14 cm
- **Covering:** AMC BASE flooring system, consisting of:
  Rigi 60 profiles on AFB 60 Floor Block + Sylomer SR-28/12 + OSB III board, 18 mm + Tabiabsorber 5 + OSB III board, 18 mm + Acoustic Floor Getzner Mat 29 + Gym floor 10 mm (rubber tiles 1x1 m)
  Note: 48 mm mineral wool between profiles, SR-11/12 installed in the perimeter of the system

The covering of the floor, due to its characteristics, belongs to Category II, according to paragraph H.2.2.2 of Annex H of the standard UNE EN ISO 10140-1:2016.

The test has been carried out in AUDIOTEC's standardized test rooms in Boecillo Technology Park (Valladolid).

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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 10140-3:2011. Acoustics. Laboratory measurement of impact sound insulation.*
- *Annex H of UNE-EN ISO 10140-1:2016 (Floor coverings. Improvement of impact sound insulation).*
- *Annexo C of UNE-EN ISO 10140-5:2016 (Standard floors for measuring the improvement of impact sound insulation of floor coverings.)u*
- *Measurement procedure and calculations presented in specific procedures PE-37 and PE-39 of AUDIOTEC's Acoustics Laboratory.*

2.2.- Methodology and test parameters

The rooms where the test was carried out comply with the regulations and requirements established in the UNE EN ISO 10140-5:2011 Standard. They are vertically adjacent rooms. One of them, the lower one or receiving, is fixed and sits under the floor level. The other one, the upper one or source room, is mobile and is placed over the slab to be tested. Both have the shape of irregular 6-faced prisms without parallel corners. The walls of the receiving room are 30 cm concrete walls and inner acoustic claddings covered with 15 mm plasterboard. It's volume is 52,8 m^3. 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 performed; the first one with the complete system, being the supporting element and the covering, and, afterwards, the supporting element alone was tested. The methodology is described below:

For each of the tests, a standardized tapping machine was placed successively in five positions distributed on the tested surface.

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In the complete system test, for each position of the tapping machine, 3 discrete measurements were made with a frequency analyzer, with measurement duration of 6 seconds each. The microphone at all times at a minimum distance from the side walls of 0.7 m and 1 m from the sample under test. The scanning radius of the microphone was of 1 m with a minimum inclination of 10º.

For the test of the supporting enclosure, for each position of the machine, three measurements were made with a rotating microphone in the diffuse field area of the receiving room. The microphone stayed at a minimum distance of 0.7 m from the side walls and 1 m from the sample under test. The scanning radius of the microphone was of 1 m with a minimum inclination of 10º. The time of each measurement was 48 seconds (3 full sweeps), enough time for the signal to stabilize.

The measurements were made in each of the 1/3 octave bands between 100 and 5000 Hz.

Afterwards, with no tapping machine, the background noise was measured in the receiving room. For the complete system, this measurement was made with 3 discrete measurements were made with a frequency analyzer, with measurement duration of 6 seconds each. For the test of the supporting element, the measurements were made with the rotating microphone, in the same conditions that when the machine was working.

In order to measure the reverberation time, 2 loudspeaker positions were used in the receiving room with a separation of more than 3 m between them.
For each loudspeaker position, 3 microphone positions were used in the receiving room to measure the reverberation. All of them were at a distance of more than 1 m from the side walls, 1.8 m between them and 2 m from the loudspeaker. Two measurements were taken in each position and the respective averages were obtained. The TR20 was measured.

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2.3.- Instrumentation used

The instrumentation used in this test was the following:

- Standardized tapping machine Brüel & Kjaer, type 3207-001, serial number 2372848.
- Brüel & Kjaer Sound source type 4292, serial number 004007.
- PULSE Analyzer, model B&K 3560-B-030, serial number 2538701.
- PHONIC MAX 860 Amplifier, serial number ABA2GBA171.
- Third octave band equalizer BEHRINGER model DEQ2496.
- B&K Microphone 4189, serial number 2534182, and B&K preamp 2669, serial number 2532870.
- Frequency analyzer Brüel&Kjaer type 2270, class 1, with serial number 3180979, previously verified. This analyzer has filters in frequency bands.
- B&K Sound calibrator type 4231, class 1, serial number 2136530.
- BARIGO Thermoanemometer, model num. 525.

2.4.- Product identification and sample description

PRODUCT	DIMENSIONS	BRAND/MODEL	ESSENTIAL PROPERTIES	
Concrete reference slab (supporting enclosure)	400 x 440 cm	--	Mass per unit area	351 kg/m^2
			Surface	17.6 m^2
Floor mount	--	AFB 60 Floor Block	Maximum load	60 kg
Sylomer	--	SR11	Thickness	12 mm
Sylomer	--	SR28	Thickness	12 mm
Profiles	60 x 28 mm	Placo Rigi 60	--	--
Mineral wool	--	--	Thickness	48 mm

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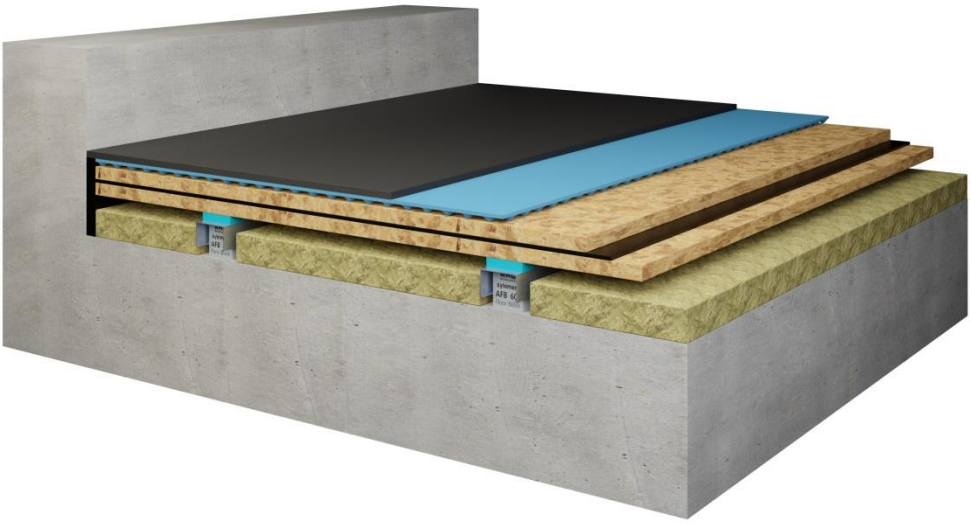
PRODUCT	DIMENSIONS	BRAND/MODEL	ESSENTIAL PROPERTIES	
OSB III board	--	--	Thickness	18 mm
Tabiabsorber 5	--	--	Thickness	5 mm
Acoustic Floor Mat 29	1500 x 750 mm	Getzner	Thickness	11 mm
Rubber tiles	1000 x 1000 mm	--	Thickness	10 mm
Screws	--	--	--	--
Silicone	--	--	--	--
Fast fix adhesive	--	--	--	--

Sample sketch (provided by client):



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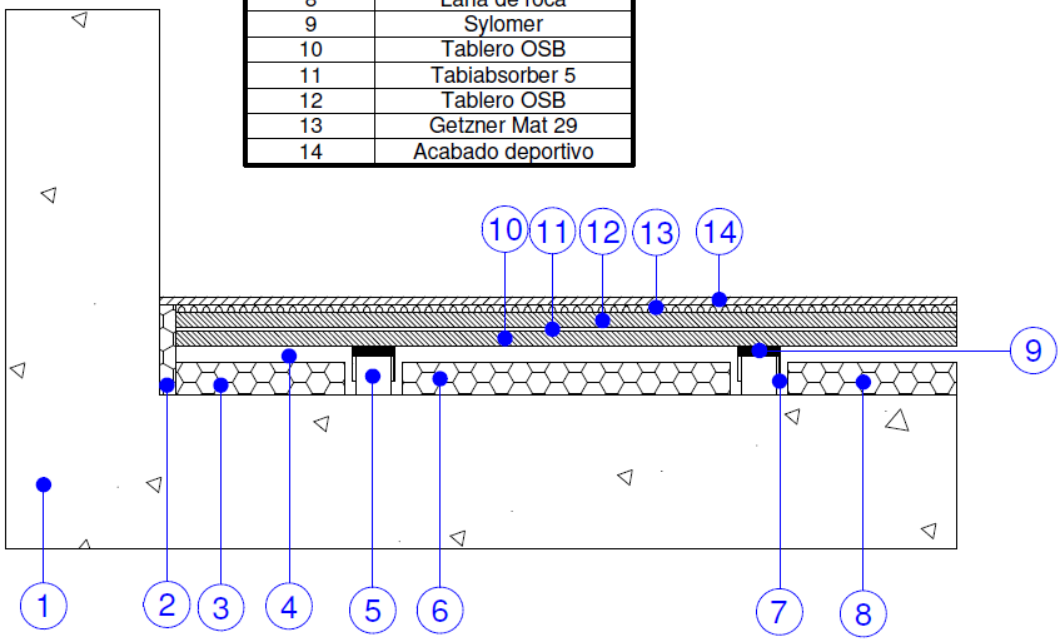
BASE	
NÚMERO	DESCRIPCIÓN
1	Forjado estructural
2	Aislamiento perimetral
3	Lana de roca
4	Plenum
5	AFB Floor Block
6	Lana de roca
7	Perfil U
8	Lana de roca
9	Sylomer
10	Tablero OSB
11	Tabiabsorber 5
12	Tablero OSB
13	Getzner Mat 29
14	Acabado deportivo



2.5.- Sample installation process

The standardized reference slab was installed between the receiving and the source room.

First, the floor mounts “AFB 60 Floor Block” were place inside the Rigi 60 profiles, keeping a 500 mm distance between the centers, and then these profiles were placed on the concrete slab, keeping a 500 mm between their axes. Next, the Sylomer SR28 strips, thickness 12 mm, were glued to the top of the profiles, and the mineral wool was installed in the space between the profiles.

Once the supporting structure was in place, a strip of Sylomer SR11 was placed in the perimeter and on a OSB III board, thickness 18 mm, was installed on the

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structure, using a fast fix adhesive. Next, a layer of Tabiabsorber 5 (thickness 5 mm) was installed on the board and another OSB III board, thickness 18 mm, was installed on top, screwing it to the supporting structure.

In the end, on the second board, the Acoustic Floor Mat 29 sheets were installed, and on top of them, the gym rubber tiles, thickness 10 mm.

2.6.- Test characteristics and conditions

Approximate nominal thickness of the system: 269 mm: slab, 140 mm + flooring system, 129 mm (Blocks + profile 55 mm, SR28 12 mm, OSB III 18 mm, Tabiabsorber 5 mm, OSB III 18 mm, Mat 29 11 mm, Rubber tiles 10 mm)
Approximate mass per unit area of the system: 390 kg/m^2 (slab, 351 kg/m^2 + flooring system, 39 kg/m^2).

Dimensions of the measurement aperture are 3.3 m wide per 3.675 m long. Common surface between the chambers is 12.12 m^2. Approximate sample surface is 14,58 m^2. The tested sample was installed by operators outsourced by AUDIOTEC.

Environmental conditions (reference slab test):

	Temperature (ºC)		Relative humidity (%)		Atmospheric pressure (mba)	
Room	**Initial**	**Final**	**Initial**	**Final**	**Initial**	**Final**
Emitting	17.2	17.2	40	40	1018	1018
Receiving	16.8	16.8	44	44		

Environmental conditions (complete system test):

	Temperature (ºC)		Relative humidity (%)		Atmospheric pressure (mba)	
Room	**Initial**	**Final**	**Initial**	**Final**	**Initial**	**Final**
Emitting	15.1	15.1	48	48	1026	1026
Receiving	15.5	15.5	43	43		

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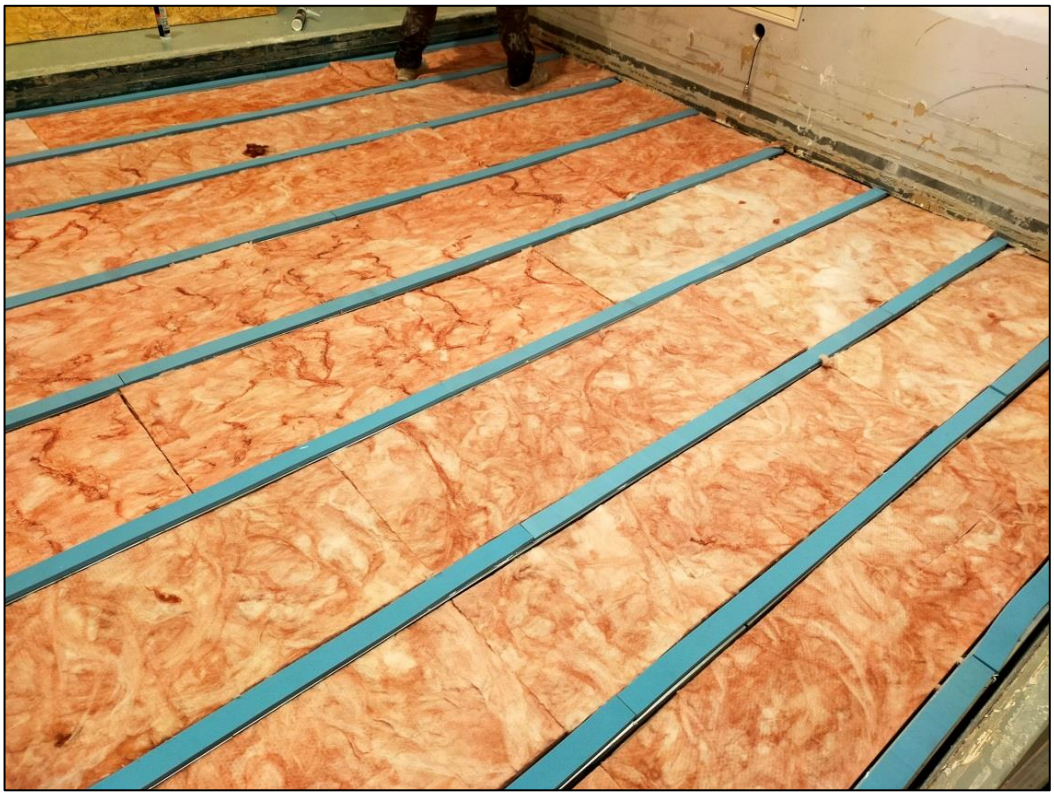
2.7.- Assembly pictures



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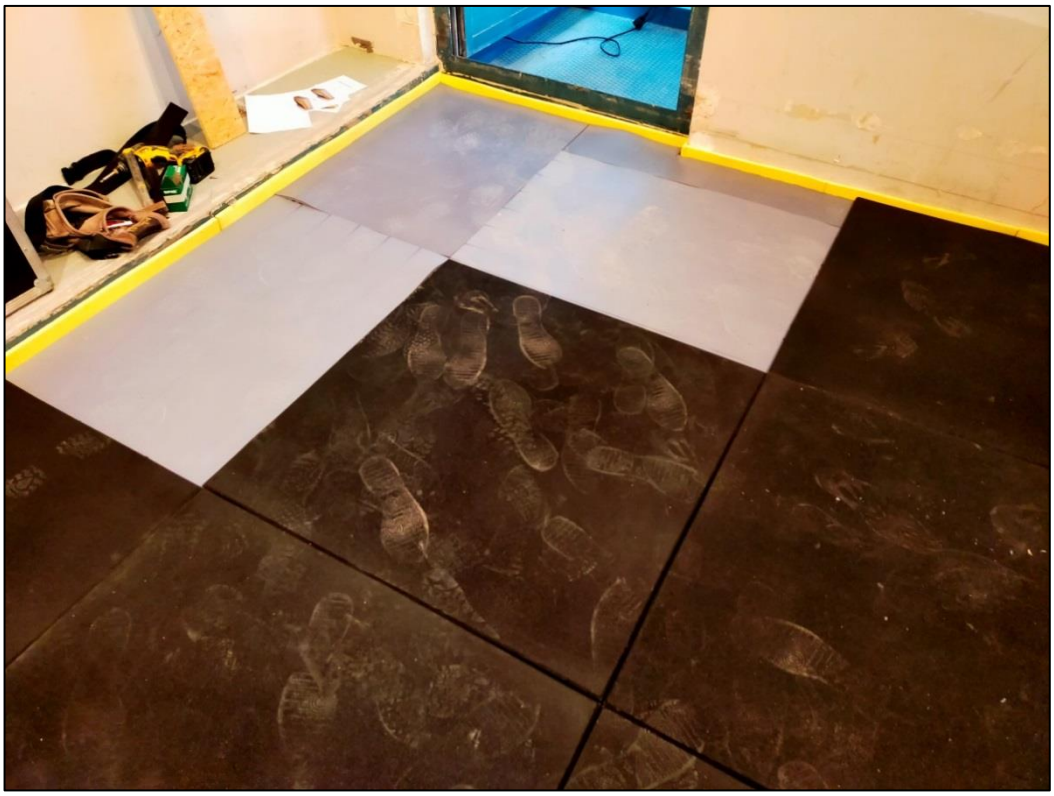

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3.- TEST RESULTS

For the tested system, a page is shown containing:

- A brief description of the tested sample.
- A chart and a graphic with the values of the impact sound reduction provided by the floor covering, ΔL.
- A chart with the standardized impact sound pressure level of the heavy slab used in the test, L_{n0}.
- A global value of the weighted impact sound reduction, ΔL_w, as well as the global value of L_{nwr} and L_{nw0}, calculated according to the standard UNE EN ISO 717-2.

Notes:

- The results of this test only concern the tested elements and in the moment and conditions in which the measurements were made.
- Measurement uncertainty is available to the customer in AUDIOTEC Acoustics Laboratory.
- This report must not be reproduced by any means unless it is made entirely and with the AUDIOTEC S.A. Acoustics Laboratory authorization.
- Annex H of UNE EN ISO 10140-1:2016 replaces Annex H of UNE EN ISO 10140-1:2011.

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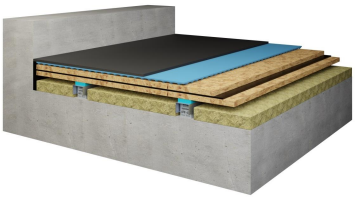
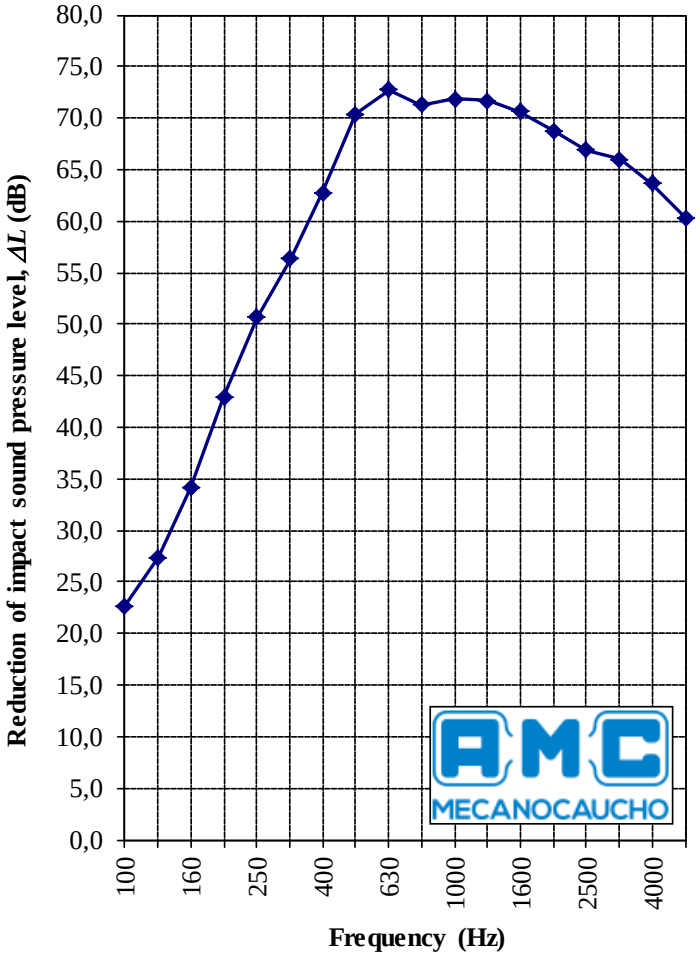
Customer: AMC Mecanocaucho
Sample identification: Concrete slab, 14 cm + AMC BASE flooring system, consisting of: Rigi 60 profiles on AFB 60 Floor Block + Sylomer SR-28/12 + OSB III board, 18 mm + Tabiabsorber 5 + OSB III board, 18 mm + Acoustic Floor Getzner Mat 29 + Gym floor 10 mm (rubber tiles 1x1 m)
Note: 48 mm mineral wool between profiles, SR-11/12 installed in the perimeter of the system
Test method: UNE-EN ISO 10140-1, Annex H. Category II sample
Thickness: 269 mm; **Mass per unit area:** 390 kg/m2



Freq f Hz	$L_{n,0}$ dB	ΔL dB
100	59,2	22,7
125	56,8	27,4
160	59,1	34,1
200	63,2	42,9
250	67,3	50,7
315	68,8	56,3
400	69,9	62,8
500	71,7	70,4
630	72,4	72,7
800	71,6	71,3
1000	70,4	71,8
1250	70,0	71,7
1600	69,5	70,6
2000	68,5	68,7
2500	68,3	66,9
3150	68,9	66,0
4000	68,1	63,7
5000	66,6	60,3



Weighted reduction of impact sound pressure level according to the standard UNE EN ISO 717-2:2013

ΔL_w = 51 dB CIΔ = -15 dB Ln w,r = 27 dB CI,r = 4 dB
Ln w,0 = 75 dB CI,0 = -9 dB

	Test date:	Technician:	Reviewed:
ENAC ENSAYOS Nº 149/LE367	February 11, 2022	Firmado digitalmente por MERILLAS FERNANDEZ MARCOS - 48915713W Nombre de reconocimiento (DN): c=ES, serialNumber=IDCES-48915713W, givenName=MARCOS, sn=MERILLAS FERNANDEZ, cn=MERILLAS FERNANDEZ MARCOS - 48915713W Fecha: 2021.04.12 12:35:43 +02'00' Signed: Marcos Merillas	Firmado digitalmente por ARENAZ GOMBAU ANGEL MARIA - 11954820H Nombre de reconocimiento (DN): c=ES, serialNumber=IDCES-11954820H, givenName=ANGEL MARIA, sn=ARENAZ GOMBAU, cn=ARENAZ GOMBAU ANGEL MARIA - 11954820H Signed: Ángel Arenaz

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