Audiotec
INGENIERÍA ACÚSTICA

LABORATORY ACOUSTIC TEST REPORT

AMC
MECANOCAUCHO

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

System: Concrete reference slab, 14 cm + "Akustik + Sylomer® 25 Floor Mount" with 50 x 50 mm wooden battens with 45 mm mineral wool between the battens + 22 mm OSB board

Ref: CAM20090054-2/AER-MEJ

Date of issue:
30 de octubre de 2020

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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 airborne sound insulation of a horizontal enclosure
SAMPLE	**Supporting enclosure:** Concrete reference slab, 14 cm thick. **Covering:** "Akustik + Sylomer® 25 Floor Mount", made by AMC, with 50 x 50 mm wooden battens with 45 mm mineral wool between them + 22 mm OSB board
TEST METHOD	**UNE EN ISO 10140-1:2016. Annex G** **UNE EN ISO 10140-2:2011**
CUSTOMER	**AMC Mecanocaucho** Industrialdea Zona A. Pab 35. Asteasu E-20159, Gipuzkoa
TEST DATE:	**October 9th and 19th, 2020**

Technician

Firmado digitalmente por MERILLAS FERNANDEZ MARCOS - 44915713W

Signed: Marcos Merillas Fernández
Laboratory Technician

Reviewed

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 Gombau
Laboratory Technical Director

CONTENT

1.- TEST OBJECT

Evaluation in standardized test rooms of the improvement of the sound reduction index, **ΔR**, of a complementary covering:

Construction system identification: Sistema horizontal compuesto por:

- **Supporting enclosure:** Concrete reference slab, 14 cm thick.
- **Covering:** “Akustik + Sylomer® 25 Floor Mount”, made by AMC, with 50 x 50 mm wooden battens with 45 mm mineral wool between them + 22 mm OSB board

The test has been carried out in AUDIOTEC’s standardized test rooms in 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 10140-2:2011. Acoustics – Laboratory measurement of sound insulation of building elements – Part 2: Measurement of airborne sound insulation.*
- *Annex G of UNE-EN ISO 10140-1:2016 (Acoustical linings – Improvement of airborne sound insulation).*
- *Annex B of UNE-EN ISO 10140-5:2011 (Standard basic elements for measuring the improvement of airborne sound insulation by linings).*
- *Annex E of Basic Document DB HR Noise Protection. April 2009.*
- *Measurement procedure and calculations presented in specific procedures PE-36 and PE-38 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.

To test were performed, the first one with the whole system (supporting slab + covering) and, afterwards, the reference slab was tested alone. The methodology for each one of them is the same and is described below:

Pink noise was generated in 2 loudspeaker positions in the source room (mobile), located at least 0.7 m from the existing walls and on a tripod at different heights. For each loudspeaker position, three measurements were made with a rotating microphone in the diffuse field area of the source room. The microphone stayed at a minimum distance of 0.7 m from the side walls, 1 m from the loudspeaker, 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 each loudspeaker position, 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.

Afterwards, the background noise in the receiving room was measured with no loudspeaker.

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.

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.

2.3.- Instrumentation used

The instrumentation used in this test was the following:

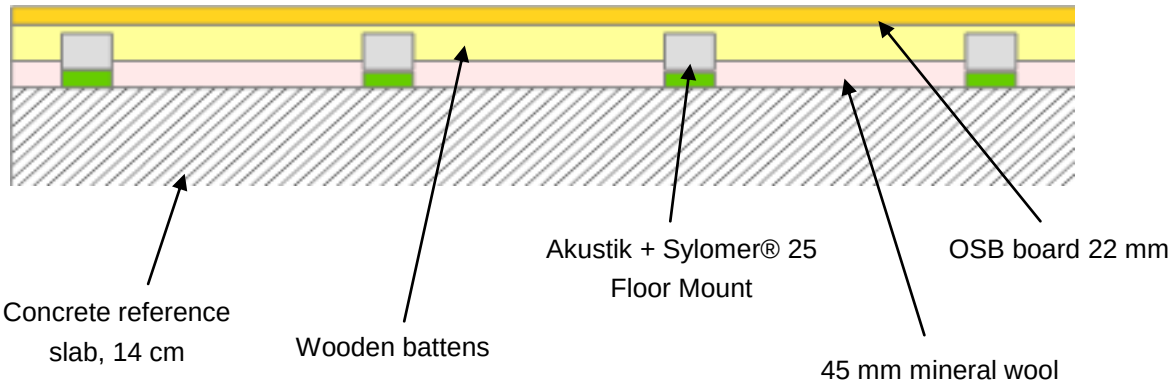
- Brüel & Kjaer Sound source type 4292, serial number 004007.
- PULSE Analyzer, model B&K 3560-B-030, serial number 2538701.
- PHONIC MAX 860 Amplifier, serial number ABA2GBA171.
- Third octave band equalizer BEHRINGER model DEQ2496.
- B&K Microphone 4189, serial number 2534182, and B&K preamp 2669, serial number 2532870.
- B&K Microphone 4189, serial number 2345614, and B&K preamp 2669, serial number 2532823.
- B&K Sound calibrator type 4231, class 1, serial number 2136530.
- BARIGO Thermoanemometer, model num. 525.

2.4.- Identification and description of the sample

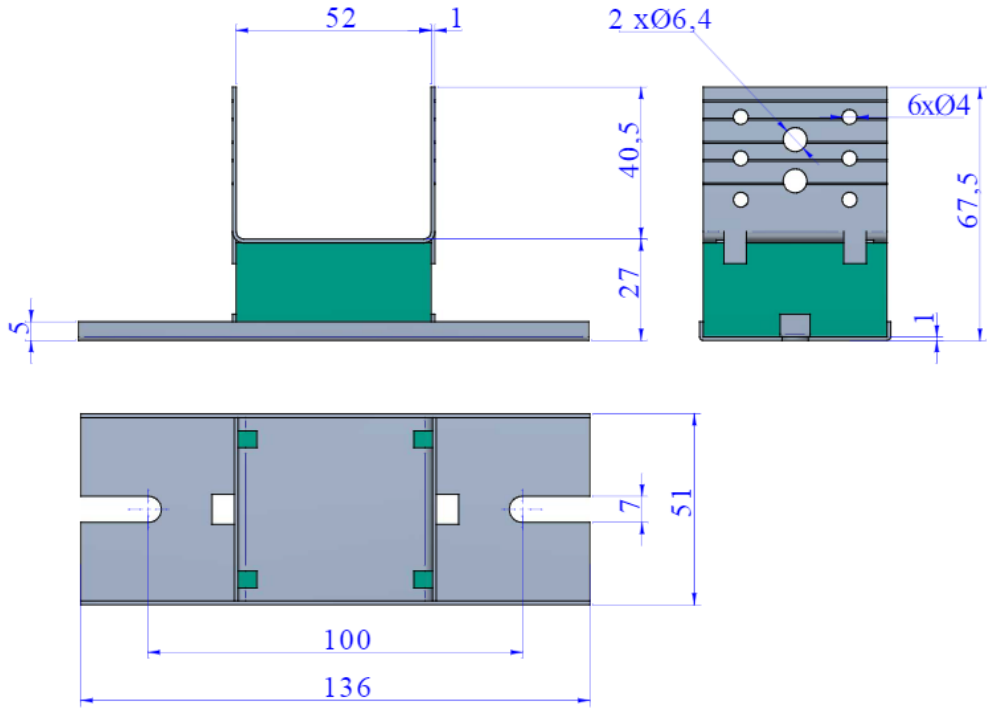
PRODUCT	DIMENSIONS	BRAND/MODEL	ESSENTIAL PROPERTIES	
Concrete reference slab (supporting closing)	400 x 440 cm	--	Mass per unit area	351 kg/m^2
			Surface	17.6 m^2
Floor mount	--	Akustik + Sylomer® 25 Floor Mount	Maximum load	25 kg
				55 lbs
Sylomer	--	SR11	Thickness	12 mm
Wooden battens	50 x 50 mm	--	--	--
Mineral wool	--	--	Thickness	45 mm
OSB board	--	--	Thickness	22 mm

PRODUCT	DIMENSIONS	BRAND/MODEL	ESSENTIAL PROPERTIES	
Screws	--	--	--	--
Silicone	--	--	--	--
Fast fix adhesive	--	--	--	--

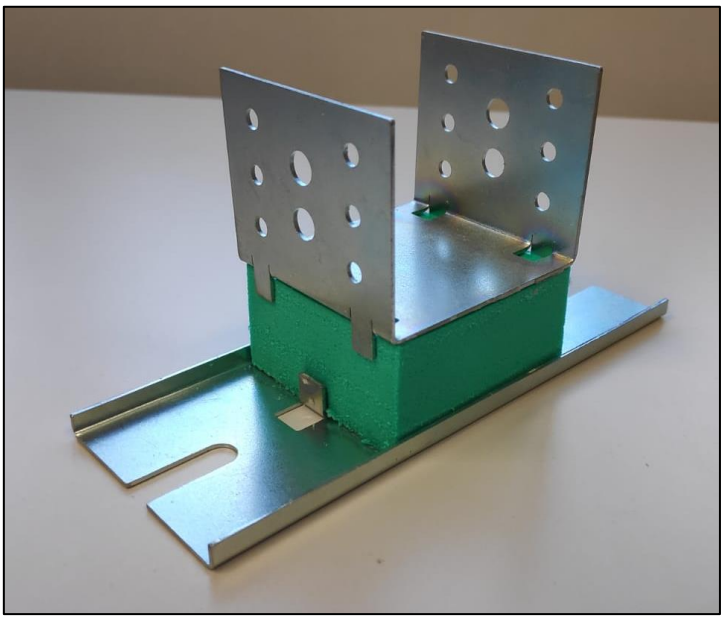
Sample sketch:



Mount sketch (dimensions in millimeters):



Mount picture:



2.5.- Sample installation process

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

Over the slab, the mounts “Akustik + Sylomer® 25 Floor Mount” were fixed using fast fix adhesive. 8 mount rows were installed, with a separation of 50 cm between them, and a separation of 50 cm between the mounts of each row. Next, the wooden battens were placed and screwed over each mount row.

After that, Sylomer SR11 was installed in the whole perimeter in order to avoid direct contact between the floating floor and the chamber. In the gaps between the battens, strips of 45 mm thick mineral wool were installed. Last, the OSB boards were placed and screwed over the battens, and joints between boards, as well as perimeter joints, were sealed using silicone.

2.6.- Test characteristics and conditions

Approximate nominal thicknes of the system: 22,9 cm (slab, 14 cm + mounts, 2.7 cm + battens, 5 cm + board, 2.2 cm). Mass per unit area of the system: 371,4 kg/m^2 (slab, 351 kg/m^2 + mounts, 0.6 kg/m^2 + battens, 5.5 kg/m^2 + board, 14.3 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.

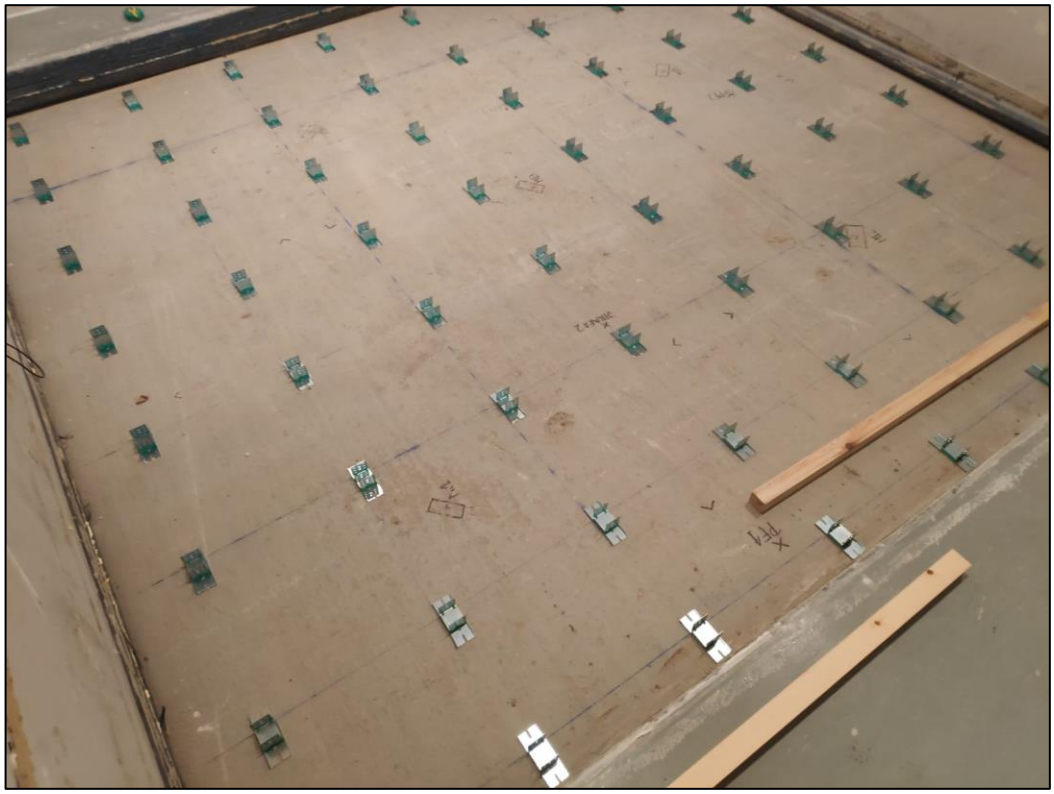
The tested sample was installed by operators outsourced by AUDIOTEC.

Upper room volume is 58,35 m^3 and lower room volume is 52,83 m^3.

For the test of the supporting slab:
In the source room temperature was 22.15 ºC ± 0,1; relative humidity was 48.5 % ± 1,4; and static pressure was 960 hPa ± 0.
In the receiving room temperature was 21.55 ºC ± 0,1; relative humidity was 47.5 % ± 0; and static pressure was 960 hPa ± 0.

For the test of the complete system:
In the source room temperature was 21,0 ºC ± 0,1; relative humidity was 46,1 % ± 0; and static pressure was 1022 hPa ± 0.
In the receiving room temperature was 21,6 ºC ± 0,1; relative humidity was 45,8 % ± 0; and static pressure was 1022 hPa ± 0.

2.7.- Pictures of assembly



3.- TEST RESULTS

Next page shows a brief description of the tested sample and a chart with the values of the sound reduction index for each third octave frequency band, in dB, as well as its corresponding graphic. It also shows the values $R_{with,}$, $R_{without}$ and ΔR following the specifications of chapter G.6. of ISO 10140-1:2010 and the values of $R_w(C,C_{tr})_{without}$ y $R_w(C,C_{tr})_{with}$.

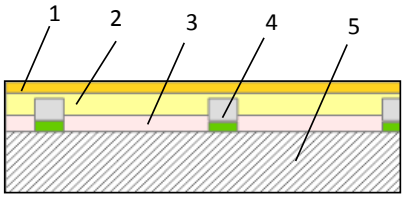
Notes:

- 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.
- The standard UNE EN ISO 10140-2:2011 replaces UNE EN ISO 140-3:1995.
- Annex G of the standard UNE EN ISO 10140-1:2016 replaces annex G of the standard UNE EN ISO 10140-1:2011, which in turn replaces the standard UNE EN ISO 140-16:2007.

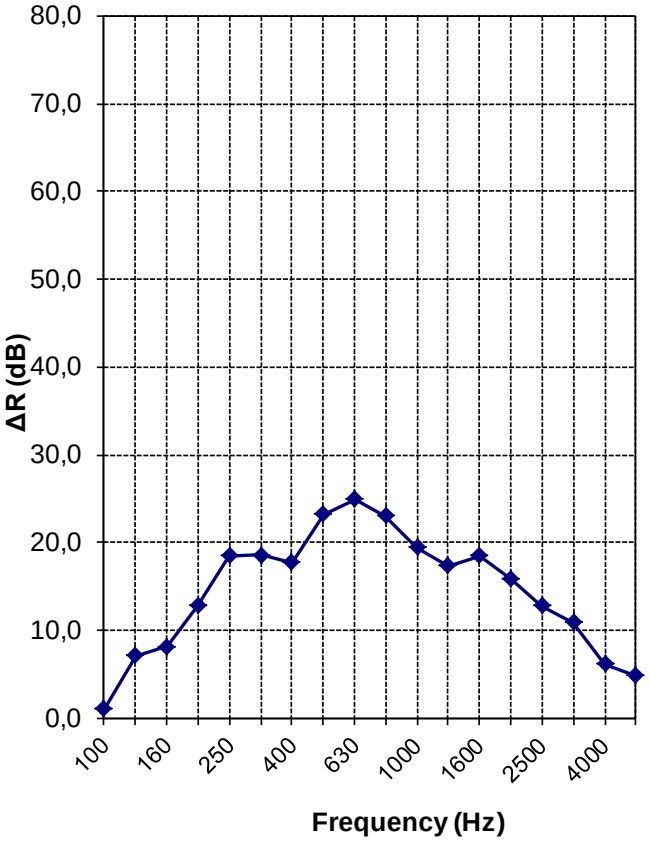
Customer: AMC Mecanocaucho
Sample identification:
(1) OSB board, 22 mm
(2) Wooden battens, 5 cm
(3) Mineral wool, 45 mm
(4) Akustik + Sylomer® Floor Mount 25
(5) Concrete reference slab, 14 cm

Test method: UNE-EN ISO 10140-1, Annex G

Thickness: 23,9 cm; **Mass per unit area:** 371,4 kg/m2



Freq f Hz	R_{with} dB	$R_{without}$ dB	ΔR dB
100	48,3	47,3	1,0
125	55,8	48,7	7,1
160	55,9	47,8	8,1
200	58,9	46,1	12,8
250	58,9	40,4	18,5
315	62,8	44,2	18,6
400	63,0	45,3	17,7
500	69,4	46,2	23,2
630	74,2	49,3	24,9
800	74,8	51,8	23,0
1000	77,7	58,3	19,4
1250	79,3	62,0	17,3
1600	82,0	63,5	18,5
2000	82,2	66,4	15,8
2500	81,9	69,1	12,8
3150	81,7	70,8	10,9
4000	78,4	72,2	6,2
5000	78,9	74,1	4,8



Rwef (C;Ctr) without = 52 (0;-5) dB
Rwref (C;Ctr) with = 67 (-2;-9) dB

$\Delta(Rw + C)_{heavy}$ = 13 dB
$\Delta(Rw + Ctr)_{heavy}$ = 11 dB

ΔR(A) (DB-HR) = 14 dBA

ΔRw_{heavy} = 15 dB

Test date: October 9th and 19th, 2020

Technician:

Audiotec INGENIERÍA ACÚSTICA
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Signed: Marcos Merillas

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