



LURRALDE PLANGINTZA, ETXEBIZITZA  
ETA GARRAIO SAILA

Etxebizitza, Lurzoru eta Arkitektura Zuzendaritza  
Eraikuntzaren Kalitate Kontrolerako Laborategia

DEPARTAMENTO DE PLANIFICACIÓN  
TERRITORIAL, VIVIENDA Y TRANSPORTES

Dirección de Vivienda, Suelo y Arquitectura  
Laboratorio de Control de Calidad de la Edificación

AKUSTIKA ARLOA kudeatzailea:  
ACOUSTICS AREA operated by:



## Test Report No. B2021-LACUS-IN-146-5

### Laboratory measurement of sound insulation

**TEST SPECIMEN:** Curtain Ref. ISINAC CURTAIN, with folded arrangement.

**APPLICANT:** ISINAC ACOUSTIC WORLD, S.L.  
Calle López de Neira 3, 3º - Oficina 301  
36203 VIGO

**USED STANDARD:** EN ISO 10140-2:2010: "Acoustics - Laboratory measurement of sound insulation of building elements. Measurement of airborne sound insulation".

**ISSUE DATE:** 23rd July 2021

**Signature:**

Technical Consultant  
Susana Lopez de Aretxaga

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**THIS REPORT CONTAINS:**

Total number of pages: 8



This document includes only and exclusively the test specimen and the moment and conditions in which those measurements were made.

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The test specimen has been subjected to the test asked by the applicant, following the specified procedures in the used standards.

Test results are detailed in the inside pages. Uncertainties of measurements are available to the applicant.



## 1. TEST SPECIMEN DESCRIPTION

The test specimen consists of a folded curtain with the following description according to the information provided by the applicant.

### **Curtain description:**



Each curtain panel is formed by 2 pieces sewn around the perimeter.

Composition of each piece:

- Lucía CS fabric: 100% Trevira CS polyester (1 mm & 265 gr/m<sup>2</sup>), in face side
- Non-woven fabric in carbon (2,5 mm & 210 gr/m<sup>2</sup>), in hidden face

Total thickness of 4 layers: 7 mm.

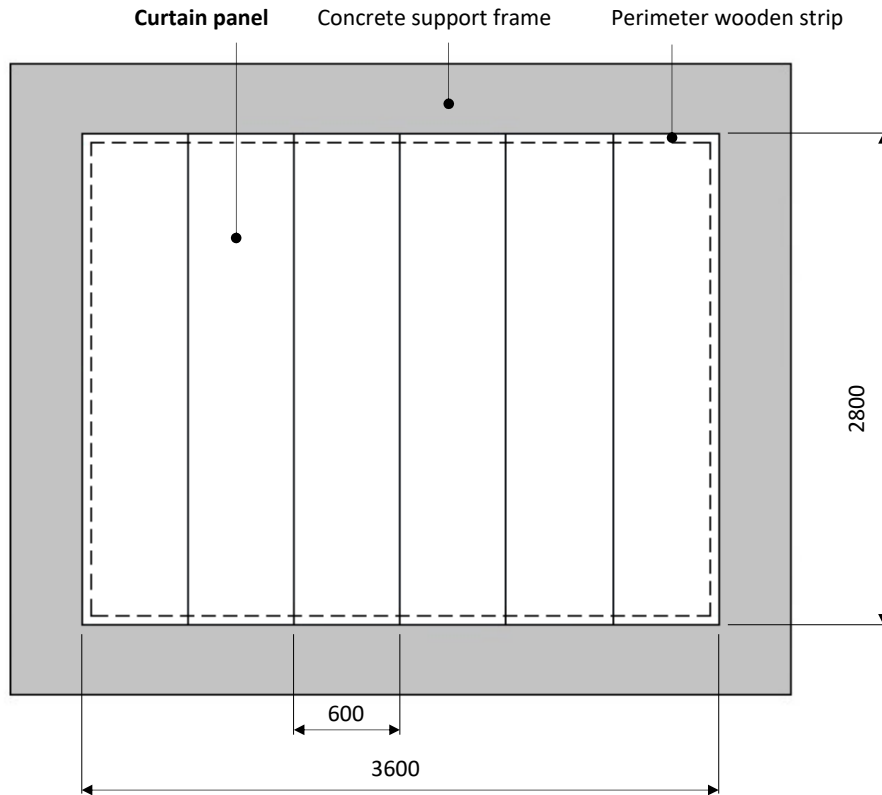
Reference: ISINAC CURTAIN

Manufacturer: ISINAC ACOUSTIC WORLD, S.L.

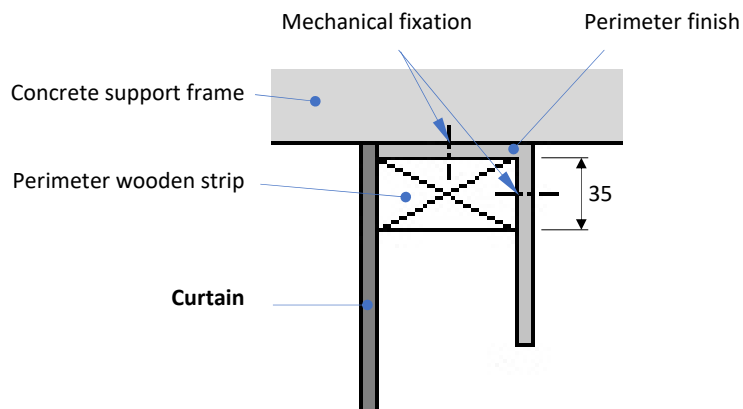
### **Arrangement of test specimen:**

The test specimen is made of 6 panels of 1600 mm wide x 2800 mm high each one, joined between them by zipper, which form a curtain of exterior dimensions of 9600 mm wide x 2800 mm high, which folding covers an area of 3600 mm wide x 2800 mm high.

The sample has a 170 mm perimeter finish of the same composition, which was mechanically fixed to a 70x35 mm perimeter wooden strip, mechanically fixed to a prefabricated concrete frame 30 cm thick and interior dimensions of 2,8 m high x 3,6 m long. The perimeter joint between sample and frame on one side and the four corners of the other side were sealed by silicone.



**Elevation**



**Section**

**Sketches of test specimen (B2021-146-M844). Cotes in mm**



**Photos of assembly of test specimen**



**Photos of test specimen in the test rooms**



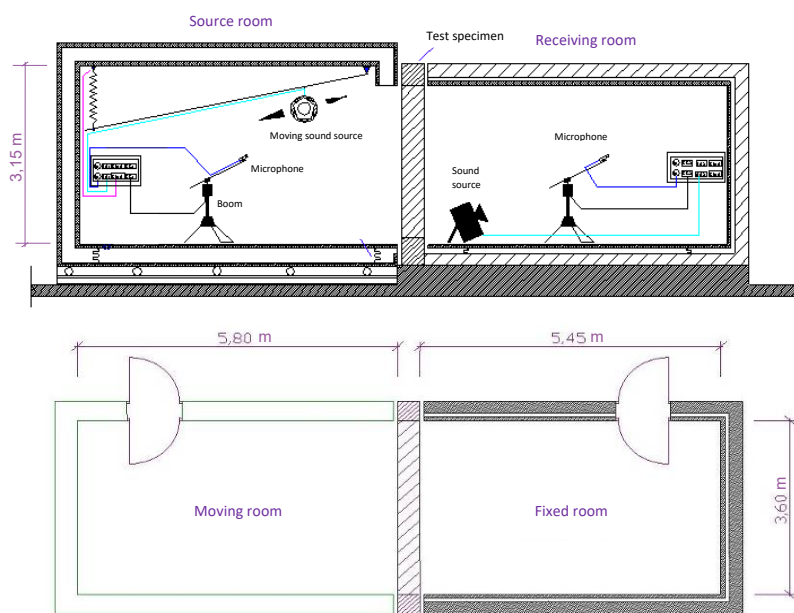
Curtain selected and delivered by: applicant

Assembly performed by: Construcciones J.L. Iglesias and Tecnalia

Assembly finished on: 19th May 2021

## 2. TEST FACILITIES

The test is performed in the horizontal transmission rooms, composed of a source and a receiving room. The receiving room is composed of a double concrete box of twenty and ten centimeters of thickness each one, acoustically disconnected and the source room, forty centimeters thick, is composed of a double box of metal frame and gypsum board, acoustically disconnected. The mobility of the source room allows the mounting of the test specimen into a support frame outside, as well its subsequent installation between the test rooms. These rooms comply with the requirements of EN ISO 10140-5:2010.



Sketch of horizontal transmission rooms

## 3. EQUIPMENT AND TEST CONDITIONS

	Source room	Receiving room
Microphones	Brüel & Kjær 4943; Serial No. 3188436	Brüel & Kjær 4943; Serial No. 3188435
Preamplifiers	Brüel & Kjær 2669; Serial No. 1948764	Brüel & Kjær 2669; Serial No. 2025844
Sound sources	Brüel & Kjær 4296; Serial No. 2071420	CERWIN VEGA; No. 012446
Booms	Brüel & Kjær 3923; Serial No. 2036584	Brüel & Kjær 3923; Serial No. 2036591



	Control room
Analyser	Nor850-MF1; Serial No. 8501186
Amplifier	LAB 300; Serial No. 970-967
Equalizer	Sony, SRP-E100; Serial No. 400238
Calibrator	Brüel & Kjær 4231; Serial No. 2061477
Atmospheric conditions meter	Rotronic BL-1D; Serial No. A19060062
Measurement uncertainty of atmospheric conditions:	
Air temperature	±0,5 °C
Air humidity	±4 %
Atmospheric pressure	±2 mbar

#### 4. TEST PROCEDURE AND EVALUATION

The sound reduction index, R, for the one-third-octave band 100 Hz to 5 KHz is calculated according to EN ISO 10140-2:2010, using the following formula:

$$R=L_1-L_2+10*\text{Log } S/A$$

L<sub>1</sub>: Average sound pressure level in the source room, in decibels

L<sub>2</sub>: Average sound pressure level in the receiving room, in decibels

S: Area of the test opening in which the test element is installed, in square metres

A: Equivalent sound absorption area in the receiving room, in square metres

The measurement of the average sound pressure levels L<sub>1</sub> and L<sub>2</sub> is performed emitting an equalized white noise, from 100 Hz to 5 kHz, with a moving omnidirectional sound source. The sound field in the source and receiving rooms is sampled using moving microphone with a sweep radius of 1 m and a traverse period of 16 s during 32 s of measure. Background noise is measured in the receiving room in the one-third-octave band 100 Hz to 5 kHz according to the same measurement process of sound field in the receiving room.

The equivalent sound absorption area between 100 Hz and 5 kHz, is evaluated from the reverberation time measured in the receiving room, using Sabine's formula:

$$A=0,16*V/T$$

A: Equivalent sound absorption area in the receiving room, in square metres

T: Reverberation time in the receiving room, in seconds

V: Receiving room volume, in cubic metres



Reverberation time in the receiving room is determined using two positions of the sound source and three fixed microphone positions for each source position, at 120° in the microphone path.

Measuring chain is verified just before and after the execution of the test.

The guidelines indicated in the applicable internal procedures have been followed:

- PE.CM-AA-61-E: "Procedure for the determination of the airborne sound insulation into the horizontal and vertical transmission rooms".
- PE.MC-AA-06-M: "Procedure to manage the test specimens for acoustic tests in laboratory".

Standard EN ISO 10140-2:2010, together with the other EN ISO 10140-1:2016, EN ISO 10140-4:2010 and EN ISO 10140-5:2010, cancels and replaces EN ISO 140-3:1995. The measurement and evaluation process applied to the test specimen described in this report is according to the standard EN ISO 10140-2:2010 and complies with cancelled EN ISO 140-3:1995.

## 5. RESULTS

The following results are presented for the test specimen:

- Sound reduction index,  $R$ , in third octave frequency bands from 100 to 5000 Hz, in table and graph.
- Weighted sound reduction index,  $R_w$ , calculated according to Standard EN ISO 717-1:2013, from the sound reduction index,  $R$ .
- Spectrum adaptation terms from 100 to 3150 Hz,  $C$  and  $C_{tr}$ , calculated according to Standard EN ISO 717-1:2013, which are the values, expressed in decibels, to be added to the global magnitude value  $R_w$  to consider the characteristics of the pink noise spectrum ( $C$ ) and traffic noise spectrum ( $C_{tr}$ ), respectively.
- A-weighted sound reduction index,  $R_A$ , from 100 to 5000 Hz, expressed to one decimal place, calculated according to the expression of *Documento Básico "DB-HR Protección frente al ruido" - Código Técnico de la Edificación (CTE)*, from the sound reduction index,  $R$ , obtained by laboratory measurement.



## Airborne Sound Insulation according to EN ISO 10140-2:2010 Laboratory Measurements

**Applicant:** ISINAC ACOUSTIC WORLD, S.L.

**Result No.:** B2021-146-M844

**Test date:** 20<sup>th</sup> May 2021

**Test specimen:** Curtain Ref. ISINAC CURTAIN, with folded arrangement.

**Description:** Each curtain panel is formed by 2 pieces sewn around the perimeter. Composition of each piece:

- Lucía CS fabric: 100% Trevira CS polyester (1 mm & 265 gr/m<sup>2</sup>), in face side
- Non-woven fabric in carbon (2,5 mm & 210 gr/m<sup>2</sup>), in hidden face



**Folding:** 9600 mm wide x 2800 mm high, which folding covers an area of 3600 mm wide x 2800 mm high.

**Test arrangement:** 6 panels joined by zipper, mechanically fixed to a perimeter wooden strip, mechanically fixed to a prefabricated concrete frame. Perimeter joint between sample and frame sealed by silicone.

Area, S, test: 10,08 m<sup>2</sup>

Estimated superficial mass: 2,5 kg/m<sup>2</sup>

Source room volume: 65 m<sup>3</sup>

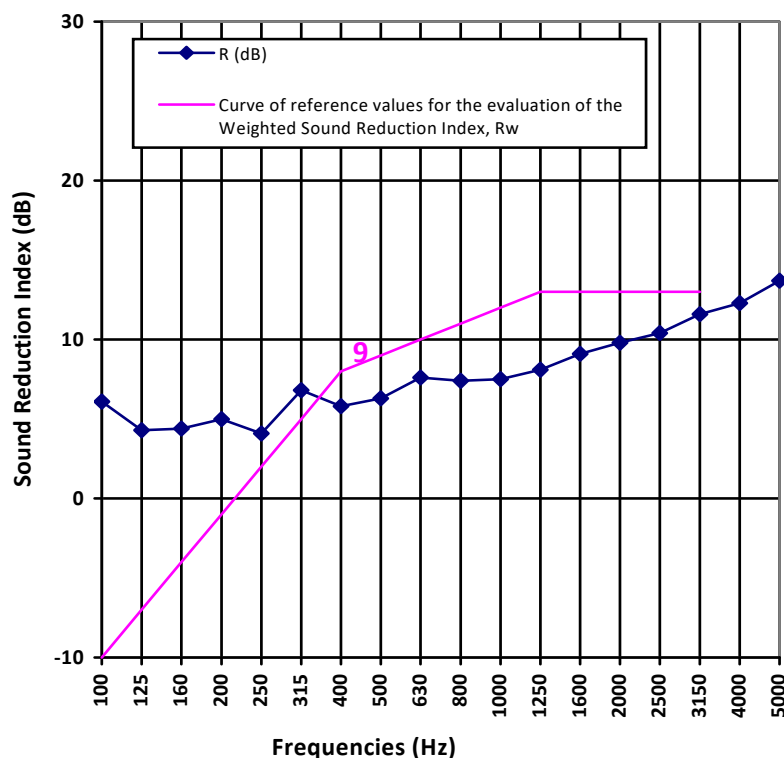
Receiving room volume: 55 m<sup>3</sup>

T<sub>rooms</sub>: 21,1 °C

HR<sub>rooms</sub>: 46 %

P<sub>rooms</sub>: 965 mbar

f (Hz)	R (dB)
100	6,1
125	4,3
160	4,4
200	5,0
250	4,1
315	6,8
400	5,8
500	6,3
630	7,6
800	7,4
1000	7,5
1250	8,1
1600	9,1
2000	9,8
2500	10,4
3150	11,6
4000	12,3
5000	13,7



Rating according to EN ISO 717-1:2013: R<sub>w</sub>(C;C<sub>tr</sub>): 9 (-1; -2) dB  
 Rating according to CTE DB-HR: R<sub>A</sub>: 9,0 dBA  
*Evaluation based on laboratory measurement results obtained by an engineering method*

