

TEST REPORT No. 118746-1

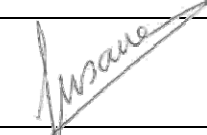
CLIENT: **ISINAC ACOUSTIC WORLD, S.L.**
Av. de Ramón Nieto, 125-bajo,
36205 Vigo (Pontevedra)

AIM: **Measurement of sound absorption in laboratory**

STANDARD: **EN ISO 354:2003**

TEST SPECIMEN: **ABSORBRELLA ILUCS**

ISSUE DATE: **11/09/2025**

Technical manager

Susana Lopez de Aretxaga

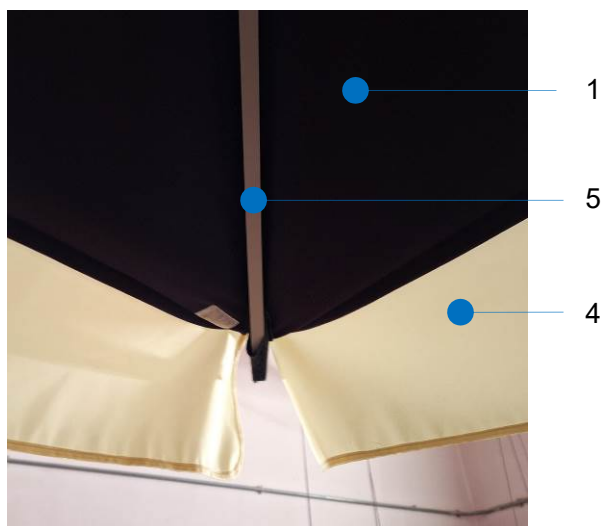


The technical ownership of the ENAC Accreditation No. 4/LE456 falls to FUNDACIÓN TECNALIA R&I, the same way as the technical signatures of this report. The test is performed by personnel of TECNALIA (Construction Lab_services Area). Facilities where the measurements are carried out belong to the Acoustics Area of the Building Quality Control Laboratory of the Basque Government, located in Agirrelanda, 10, 01013 VITORIA-GASTEIZ (Spain) operated by TECNALIA.

- The results of the current report concern only and exclusively the sample tested.
- This report shall not be reproduced, except in full, without the express authorization of FUNDACIÓN TECNALIA R&I.
- Uncertainty of measurement is available to the client, if required.
- Sample name provided by the client.
- TECNALIA is not responsible for the information provided by the client. This information is not accredited.

1. TEST SPECIMEN DESCRIPTION

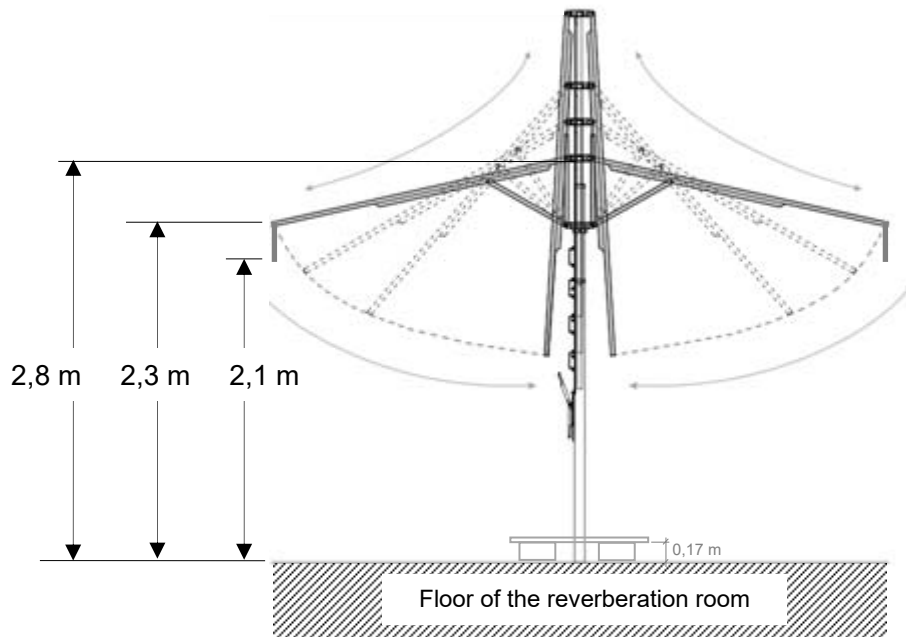
The test specimen consists of a parasol with ABSORBRELLA ILUCS sound-absorbing material, as detailed below according to the information supplied by the client.



1. ILUCS - 100% POLYESTER TREVIRA CS [$\sim 0,5$ mm thick and 265 gr/m^2]
2. PS220 – Polyester [$\sim 2,2$ mm thick and 220 gr/m^2] *
3. TNT20- Polyester [$\sim 0,1$ mm thick and 20 gr/m^2] **
4. PVC tarpaulin [$\sim 0,85$ mm thick and 220 gr/m^2]
5. Steel frame

* Between ILUCS and TNT20

** Between TNT20 and PVC



Open parasol dimensions: $2,5 \times 2,5 \text{ m} = 6,25 \text{ m}^2$

Steel base dimensions: $625 \times 625 \text{ mm}$ and 6 mm thick, elevated 17 cm

Description of test specimen (118746-1)

2. TEST ARRANGEMENT

Open parasol placed on the floor of the reverberation room, according to the following sketch:

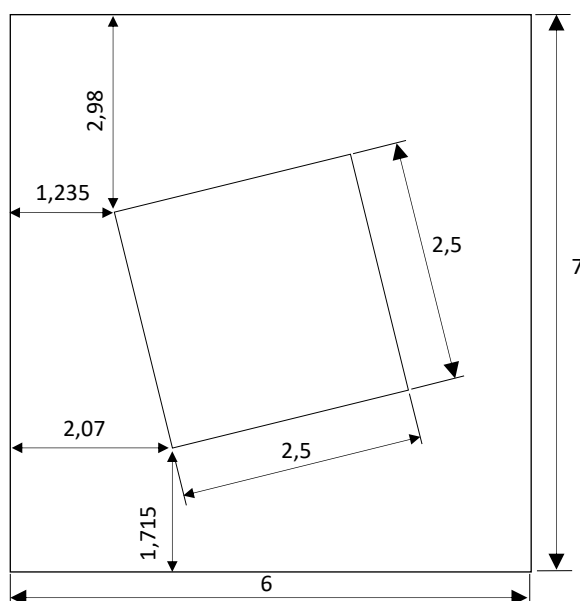


Photo and arrangement of test specimen. Cotes in m

The specifications of the test standard are met except that, due to the size of the sample, it is not possible to meet the requirement to set 3 different sample positions separated at least 2 m between them. This is a deviation from the standard.

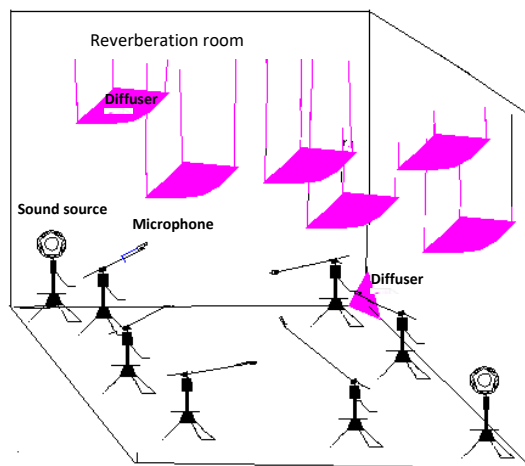
Material selected and delivered by: client.

Placement of test specimen in test room performed by: Tecnalía.

Placement date: 10th July 2025.

3. LABORATORY TEST FACILITY

The test is performed in the reverberation room. This room is a regular parallelepiped of 7x6x5 meters with a total surface area of 211,8 m² (walls, floor and ceiling). The sound field diffusivity of the room is obtained by means of twenty diffusers (between 1 and 1,2 m²) suspended from the ceiling of the room and eight edged diffusers. The room complies with the requirements of EN ISO 354:2003.



Sketch of the reverberation room

4. EQUIPMENT AND TEST CONDITIONS

Equipment

Microphones	Brüel&Kjær 4943; Serial No. 3188436	Brüel&Kjær 4943; Serial No. 3188435
Preamplifiers	Brüel&Kjær 2669; Serial No. 2025848	Brüel&Kjær 2669; Serial No. 2025844
Analyzer	Nor850-MF1; Serial No. 8501186	
Sound source	Brüel&Kjær 4296; Serial No. 2071428	
Amplifier	LAB 300; Serial No. 970-967	
Equalizer	Sony, SRP-E100; Serial No. 400238	
Calibrator	Brüel & Kjær 4231; Serial No. 2061476	
Atmospheric conditions meter	Rotronic BL-1D; Serial No. A21050028	

Climatic conditions:	Empty room	Room with test specimen	Uncertainty
Air temperature (°C)	21,7	21,7	±0,5
Relative humidity (%)	61	61	±3
Static pressure (mbar)	956	959	±6

5. TEST PROCEDURE AND EVALUATION

The equivalent sound absorption area of an individual object, for the one-third-octave band from 100 Hz to 5 kHz, is calculated according to EN ISO 354:2003, using the following formula:

$$A_{obj} = \frac{A_T}{n}$$

A_T : Equivalent sound absorption area of test specimen (m^2)

n : Number of objects used in the test

The equivalent sound absorption area of the 'n' objects is calculated according to the formula:

$$A_T = 55,3 \cdot V \cdot \left(\frac{1}{c_2 \cdot T_2} - \frac{1}{c_1 \cdot T_1} \right) - 4 \cdot V(m_2 - m_1)$$

V : Volume of empty reverberation room (m^3)

c_1 : Propagation speed of sound in air in empty reverberation room (m/s)

c_2 : Propagation speed of sound in air in reverberation room with test specimen (m/s)

T_1 : Reverberation time of empty reverberation room (s)

T_2 : Reverberation time of reverberation room with test specimen (s)

m_1, m_2 : Power attenuation coefficients, in reciprocal metres, calculated according to ISO 9613-1, using the climatic conditions in the reverberation room

The sound absorption coefficient, α_s , for the covered surface of a configuration of objects is calculated for the one-third-octave frequency band from 100 Hz to 5 kHz according to standard EN ISO 354:2003, using the following formula:

$$\alpha_s = A_T/S$$

A_T : Equivalent sound absorption area of test specimen (m^2)

S : Area covered by test specimen (m^2)

Reverberation time measurement is performed using the interrupted noise method and is obtained by arithmetic average of measurements at 2 source positions and 6 fixed microphone positions for each source position.

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.MC-AA-63-E: "Procedure to determine the sound absorption in a reverberation room, according to standard EN ISO 354".
- PE.MC-AA-06-M: "Procedure to manage the test specimens for acoustic tests in laboratory."

6. RESULTS

The following results are featured for the test specimen:

In page 7:

The equivalent sound absorption area, A_{obj} , in m^2 :

- for the one-third-octave bands from 100 to 5000 Hz
- for octave bands from 125 to 4000 Hz, according to ISO 20189:2018

The values in octave bands are calculated as an arithmetic mean of the values in the one-third-octave bands.

The equivalent sound absorption area of a single object, A_{obj} , is a frequency-dependent parameter, in m^2 , used to describe the sound absorption capacity of an interior acoustic product of defined size and generally assembled in an independent way.

The intermediate data obtained in the test are:

f (Hz)	T ₁	T ₂	A _T
100	9,08	6,55	1,4
125	8,09	5,61	1,8
160	8,96	4,98	3,0
200	10,15	4,87	3,6
250	10,03	4,52	4,1
315	9,10	4,26	4,2
400	9,01	3,98	4,7
500	9,20	3,76	5,3
630	8,43	3,46	5,8

f (Hz)	T ₁	T ₂	A _T
800	8,07	3,23	6,3
1000	7,64	2,94	7,0
1250	6,92	2,70	7,6
1600	6,27	2,51	8,0
2000	5,51	2,37	8,1
2500	4,72	2,21	8,1
3150	3,83	2,03	7,8
4000	3,14	1,84	7,6
5000	2,37	1,54	7,7

As additional information, the single object sound absorption coefficient α_{obj} is presented in octave bands from 125 Hz to 4 kHz (for use in 3D simulations), calculated from A_{obj} according to Annex B of ISO 20189:2018:

$$\alpha_{obj} = A_{obj} / S$$

A_{obj} : Equivalent sound absorption area in octave bands of the object

S : Total exposed surface area of the simplified acoustic representation of the single object in the test mounting conditions. For this sample: 17,5 m^2 .

In page 8:

- Sound absorption coefficient, α_s , per one-third octave frequency bands from 100 to 5000 Hz, for the projected surface.
- Likewise, the following parameters obtained according to standard EN ISO 11654:1997, from the sound absorption coefficient α_s :
 - Practical sound absorption coefficient, α_p , in octave frequency bands from 125 to 4000 Hz
 - Weighted sound absorption coefficient, α_w
 - Shape indicators: L.M.H

Sound Absorption according to EN ISO 354:2003 Laboratory measurements

CLIENT: ISINAC ACOUSTIC WORLD, S.L.

TEST DATE: 11/07/2025

RESULT No.: 118746-1-1

TEST SPECIMEN: **ABSORBRELLA ILUCS**

Acoustic parasol, of 2500x2500 mm (opened parasol), with sound-absorbing material suspended from the bottom, open on a mast, at a height of 2,3 m from the floor.

No. of objects used (n): 1 Arrangement: Randomly distributed

Mounting type: VI.2 according to Annex E of ISO 20189:2018

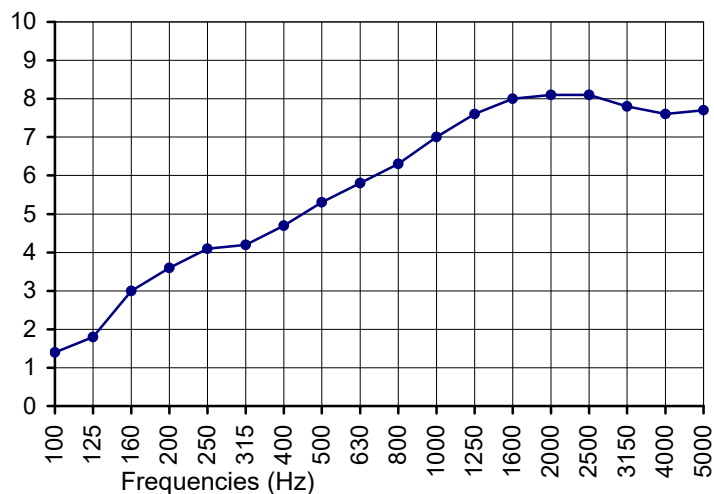
Reverberation room volume: 209,6 m³



ILUCS - 100% POLYESTER TREVIRA CS
+ Polyester + TNT + PVC tarpaulin

Equivalent sound absorption area of a single object A_{obj} (m ²)		
f (Hz)	1/3 octave bands	Octave bands
100	1,4	2,1
125	1,8	
160	3,0	
200	3,6	4,0
250	4,1	
315	4,2	
400	4,7	5,3
500	5,3	
630	5,8	
800	6,3	7,0
1000	7,0	
1250	7,6	
1600	8,0	8,1
2000	8,1	
2500	8,1	
3150	7,8	7,7
4000	7,6	
5000	7,7	

Equivalent sound absorption area, A_{obj} (m²)



Additional information:

Single object sound absorption coefficient, α_{obj} , according to ISO 20189:2018-Annex B

f (Hz)	125	250	500	1000	2000	4000
α_{obj}	0,10	0,25	0,30	0,40	0,45	0,45



Sound Absorption according to EN ISO 354:2003 Laboratory measurements

CLIENT: ISINAC ACOUSTIC WORLD, S.L.

TEST DATE: 11/07/2025

RESULT No.: 118746-1-2

TEST SPECIMEN: **ABSORBRELLA ILUCS**

Acoustic parasol, of 2500x2500 mm (opened parasol), with sound-absorbing material suspended from the bottom, open on a mast, at a height of 2,3 m from the floor.

Specified array of objects.

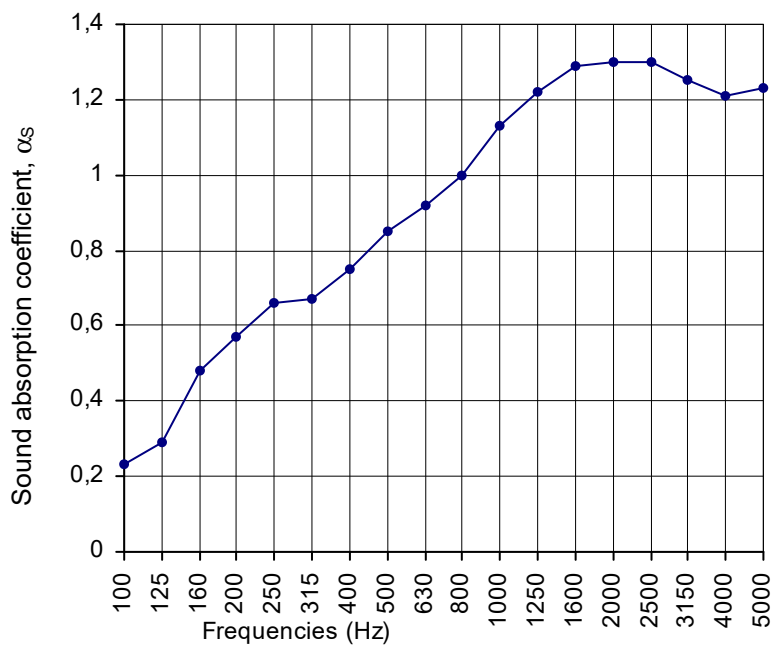
Area, S, covered by the test specimen: 6,25 m²

Reverberation room volume: 209,6 m



ILUCS - 100% POLYESTER TREVIRA CS
+ Polyester + TNT + PVC tarpaulin

f (Hz)	α_s	α_p
100	0,23	0,35
125	0,29	
160	0,48	
200	0,57	0,65
250	0,66	
315	0,67	
400	0,75	0,85
500	0,85	
630	0,92	
800	1,00	1,00
1000	1,13	
1250	1,22	
1600	1,29	1,00
2000	1,30	
2500	1,30	
3150	1,25	1,00
4000	1,21	
5000	1,23	



Weighted sound absorption coefficient
according to EN ISO 11654:1997

$\alpha_w = 0,90$

