

**Acoustic tests of the noise barrier insertion loss and reverberation time after
system installation “ABSORBRELLA”
In a terraze placed in “Café Gastrobar Sentir Nerja”
Plaza Tutti Frutti, Nerja (Málaga).**

Applicant: Isinac Acoustic World S.L.

Inspection Entity: T-Ingeniamos Engineering Management S.L.

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Málaga January, 9th of 2019

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1 Purpose and scope of the report

The purpose of this document is to present the results obtained in the barrier insertion loss and reverberation time tests, on an outdoor terrace where parasols with the ABSORBRELLA sound-absorbing system have been installed.

The scope of the requested report is as follows:

- Barreras (Ilbarrera) insertion loss test due to the ABSORBRELLA sound-absorbing system added to the sunshades.
- Reverberation time (RT) test following the guidelines of the UNE-EN ISO 3382-2:2008 standard before and after the installation of the sunshades with the ABSORBRELLA sound-absorbing system incorporated.
- The report is requested by **Isinac Acoustic World S.L.**

The tests were carried out on the outside terrace of a coffeshop local placed in the Tutti Frutti square, in municipality of Nerja. It is a private terrace with Access through the public road that is made from said square. The terrace is delimited on its three sides by the facades of residential buildings. The terrace has an approximate área of 90 square meters.

The tests were carried out between the 10.00 and the 18.00 hours on Wednesday 19-12-2018.



Emplazamiento de los Ensayos

The terrace does not have any awning or pergola-type upper wall, so it is an open space. In order to delimit an area in which to carry out reverberation time tests, following the guidelines of the UNE-EN-ISO 3382-2 standard, a volume of 270 cubic meters has been taken into account.



Imagen de la terraza



Imagen de la terraza

3 Reference documents

For the drafting of this report, the different reference regulations have been considered:

- UNE-EN ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories.
- UNE-EN ISO 3382-2:2008 Acoustic. Measurements of reverberation time in ordinary rooms.
- Royal Decree 1371/2007, of October 19, which approves the basic document "DB-HR Protection against noise" of the Technical Building Code and modifies Royal Decree 314/2006, of March 17, which approves the Technical Building Code.
- PPR-E-TING-006.2
- PPR-E-TING-007.1
- Royal Decree 1367/2007 of October 19, which develops Law 37/2003 of November 17, on Noise, in relation to acoustic zoning, quality objectives and acoustic emissions..
- Royal Decree 1513/2005 of December 16, which develops Law 37/2003 of November 17, on Noise, in relation to the evaluation and management of environmental noise.
- Order ITC/2845/2007, of September 25, which regulates the metrological control of the State of the instruments used to measure audible sound and acoustic calibrators.
- UNE-EN ISO 1996-1: Acoustic. Description, measurement and evaluation of environmental noise. Part 1: Basic quantities and evaluation methods.
- UNE-EN ISO 1996-2: Acoustic. Description, measurement and evaluation of environmental noise. Part 2: Determination of ambient noise levels.
- ISO 10847:1997: Acoustics. In-situ determination of insertion loss of outdoor noise barriers of all types.
- ANSI-S12.8:1998 Methods for the determination of insertion loss of outdoor noise barriers.
- Cyril M. Harris. Manual de medidas acústicas y control del ruido. 3ª Ed.

4 System Description

It is a system based on sound-absorbing material that, once installed, is suspended from the lower part of the parasol, creating a sound-absorbing surface on practically the entire surface of the parasol. It was installed 10 parasols. The parasols are square with a side of about 2.5 meters, so each parasol has an area of 6.25 square meters.



5 Description of the tests carried out

The tests carried out and the spaces involved in them are shown below:

Acta	Emitting	Recipient	Type of test
1	Terrace	Housing facade 1º Floor	Barrier Insertion Loss
2	Terrace	Terrace	Reverberation time (before and after installation of parasols with ABSORBRELLA system)

A sound barrier is any relatively sound-opaque solid obstacle that blocks the receiver's line of sight to the sound source. Barriers can be installed specifically to reduce noise, for example solid fences or earthen dykes, or they can occur naturally for other reasons, such as insulated buildings or walls. Barriers can be used against noise nuisance produced by leisure facilities. The use of a barrier is especially interesting when there is no control over the emission of noise by the disturbing source.

The usual measure of the acoustic performance of a barrier is the insertion loss. The insertion loss of a barrier for a third octave band, at a given point, is the difference between the sound pressure levels of the band (measured at that point) before and after the installation of the barrier:

$$IL_{barrera} = L_p(before) - L_p(after) [dB]$$

For the insertion loss test, the ABSORBRELLA system has been considered as the barrier to try to characterize the effectiveness of said mechanism. Therefore, the samples corresponding to L_p (before) refer to the situation in which the sunshades are installed, but without the ABSORBRELLA system. The samples corresponding to L_p (after) refer to the situation in which the sunshades are installed, including the ABSORBRELLA system.

For the reverberation time test, the samples corresponding to Tr (before) have been taken into account as the situation in which umbrellas are not installed and the samples corresponding to Tr (after) as the situation in which umbrellas are installed. parasols including the ABSORBRELLA system.

6 Conclusions

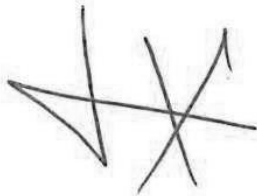
From the measurements and evaluations carried out, it can be deduced that:

The ABSORBRELLA system introduces a considerable loss due to the insertion of the barrier towards the facades of the adjoining residential buildings, considering the sunshades installed on the terrace of the establishment as a barrier.

The reverberation time of the exterior space due to the reflections on the facades and walls of the terrace is reduced by the placement of the parasols with the ABSORBRELLA system..

The results of the tests are shown in their corresponding minutes attached to this report.

Málaga, January 9th of 2019



Jose Miguel Molina Magaña

Postgraduate Acoustic Engineering

Telecommunications Technical Engineer

Collegiate member COITT nº 12.278



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Telecommunications Technical Engineer

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Annex I

Equipment verification certification



Verificaciones Industriales de Andalucía, S.A.
CONSEJERÍA DE EMPLEO, EMPRESA Y COMERCIO

C/ Albert Einstein, 2
41092 Sevilla
Teléfono: 955 04 40 00
Correo-e: metro@velasa.es

CERTIFICADO DE VERIFICACIÓN

Calibrador acústico

Certificado número 00S18000552/0001

Tipo de verificación Periódica

Titular

Entidad: T-INGENIAMOS ENGINEERING MANAGEMENT S.L.

Dirección: C/ LA GITANILLA, 17. OF. 30

Localidad: MALAGA. 29004

Provincia: MALAGA

Características del instrumento

Marca: BRÜEL & KJÆR

Modelo: 4231

Nº de serie: 2671653

Comprobaciones y ensayos realizados de acuerdo a la Instrucción ITTMET 86 establecida por VEIASA en base a la Orden ITC/2845/2007 que regulan el Control Metrológico del Estado de los instrumentos destinados a la medición de sonido audible y de los calibradores acústicos.

Resultado de la verificación:

CONFORME

Fecha verificación 09/05/2018

Fecha emisión 09/05/2018

Fecha validez 09/05/2019

La fecha de validez es la indicada siempre que no exista una reparación o modificación del instrumento.



Fdo GARCIA CONS, RAFAEL

Cargo Verificador Laboratorio Central

Los resultados se refieren al momento y condiciones en que se efectuaron las mediciones, afectando únicamente a la muestra sometida a verificación.

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Organismo Autorizado de Verificación Metrológica acreditado por ENAC, con acreditación nº OC-I/420, y autorizado por la Dirección General de Industria, Energía y Minas de la Junta de Andalucía con nº 17-OV-001.

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CERTIFICADO DE VERIFICACIÓN

Sonómetro

Certificado número 00S18000552/0002

Tipo de verificación Periódica

Titular

Entidad: T-INGENIAMOS ENGINEERING MANAGEMENT S.L.

Dirección: C/ LA GITANILLA, 17. OF. 30

Localidad: MÁLAGA. 29004

Provincia: MÁLAGA

Características del instrumento

Marca: BRÜEL & KJÆR

Modelo: 2250 (MIC 4950)

Nº de serie: 2676037

Nº de serie microfono: 2662867

Comprobaciones y ensayos realizados de acuerdo a la Instrucción ITMET 86 establecida por VEIASA en base a la Orden ITC/2845/2007 que regulan el Control Metrológico del Estado de los instrumentos destinados a la medición de sonido audible y de los calibradores acústicos.

Resultado de la verificación:

CONFORME

Fecha verificación 09/05/2018

Fecha emisión 09/05/2018

Fecha validez 09/05/2019

La fecha de validez es la indicada siempre que no exista una reparación o modificación del instrumento.


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