



FORUM ACUSTICUM EURONOISE 2025

ACOUSTIC COMFORT IN BUILDINGS, SAINT-GOBAIN BAROMETER 2024. TOOLS FOR DESIGNING ACOUSTIC COMFORT IN BUILDINGS.

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ABSTRACT

Does the current Technical Building Code (DB HR) provide the acoustic comfort required by users? In 2024, the 2nd Saint-Gobain Housing Barometer was carried out to answer the many questions that arise about the situation of main residences in Spain and the immediate future expectations of those who live in them. More than 1,000 people between the ages of 18 and 70 were interviewed in five major urban centers and smaller towns, with the help of CAWI methodology, which guarantees a 95.5% confidence interval.

Among the concerns of the users, acoustic insulation concerns half of the respondents and it's linked with the sustainability of the building.

In this paper, we will discuss the survey carried out, the current requirements of the DB HR and its future planned modification, and the Acoustic Classification of Buildings standard, as well as the Saint-Gobain Acoustic software, which helps to select construction solutions that meet user requirements, both for renovation and new construction.

Keywords: CTE DB HR, acoustic comfort, survey, software, Saint-Gobain Acoustic.

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1. INTRODUCTION

In 2021, the first Home Barometer was carried out, analyzing the situation of the main residence in Spain and the main concerns of its users. The aim of this Barometer was to answer the many questions that have arisen about the situation of main residences in Spain and the immediate future expectations of those who live in them. The study focused on the main residence buildings, gathering the opinions and evaluations of the household members, who are the current or potential decision-makers, regarding the main residence, such as buying, renting, renovating...

This Barometer was marked by the impact of the pandemic and the post-confinement period, a time when new needs were activated in our homes.

In 2023, the Barometer has been repeated and includes, in addition to the aspects covered in 2021, sustainability and the impact of teleworking on the perception of housing.

2. INSULATION AND ACOUSTIC COMFORT. RESULTS IN THE 2024 BAROMETER

One of the main housing concerns in the Barometer is acoustic insulation, at 48%. When broken down by age, we see that younger generations are most concerned about this aspect of their current home.

Principales preocupaciones sobre la vivienda	Total	18-29 Generación Z	30-44 Millennials	45-59 Generación X	60-70 Boomers
Aislamiento acústico	48 %	51,5 %	53,3 %	47,9 %	35,0 %

Figure 1. Concern about acoustic insulation in the usual residence by age.





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When broken down by type of family, the percentage varies according to whether people live alone, with children or with a family member.

Principales preocupaciones sobre la vivienda	Total	tipo de hogar				
		Sólo	En pareja sin hijos	En pareja con hijos	Con mis padres	Con algún familiar
Aislamiento acústico	48 %	54,0 %	44,9 %	53,2 %	40,0 %	33,7 %

Figure 2. Concern about acoustic insulation by family type.

Similarly, the importance of soundproofing changes depending on whether the dwelling user teleworks or not: 55% of teleworkers consider soundproofing to be very important, while this figure falls to 45% for users who do not telework. Teleworking increases the need to improve acoustic insulation, brightness, space and views.

But not only does teleworking increase the amount of time we spend at home, more than 44.8% of respondents say that they spend more time at home since the pandemic, so the need for acoustic comfort in the usual home is also important in this case.

In terms of concern about acoustic insulation by geographical area, the percentages are as follows:

Principales preocupaciones sobre la vivienda	Total	Madrid	Barcelona	Bilbao	Sevilla	Valencia	Resto de España
Aislamiento acústico	48 %	45,9 %	48,6 %	56,1 %	60,0 %	53,1 %	45,9 %

Figure 3. Sound insulation concerns by geographical area.

In the south of Spain, the importance of good acoustic comfort is 15% higher than in other regions.

When it comes to buying a new home, acoustic insulation becomes even more important, with 87.8% of respondents considering soundproofing to be an important aspect when choosing a home.

When asked about renovating their current home, 26.5% of people who have carried out renovations in their home have done so with the motivation of improving its acoustic insulation, and this percentage rises to 31.3% in the case of teleworkers. If we analyze these renovations according to the year of construction of the building, we see that they are the same in houses built before 1979 (before any acoustic regulations) and in houses built after 2007, with the

Technical Acoustic Code already in force, so the perception of low acoustic comfort in current houses remains even to be built with acoustic parameters.

Motivos reforma vivienda	año de construcción			
	Total	<1979	1980-2006	2007>
El aislamiento acústico (minimizar/eliminar ruidos)	26,5 %	29,4 %	22,4 %	29,4 %

Figure 4. Percentage of acoustic insulation renovations by year of construction.

As a conclusion of the 2024 Barometer on insulation and acoustic comfort, we can see that the concern for acoustics in the home is not diminishing and is even increasing for those users who telework and need a suitable acoustic environment to concentrate.

3. REGULATIONS APPLICABLE TO HOUSING

3.1 Current regulations. DB HR and UNE 74201

In October 2007, as part of the Technical Building Code, the Basic Document on Noise Protection (DB HR) was published, which became mandatory in 2008, six months after its publication.

In the survey, the year of construction of the buildings was as follows:

Año de construcción vivienda actual	Total
De 1979 o anterior	26,3 %
Entre 1980 y 2006	39,1 %
Entre 2007 y 2012	14,6 %
Entre 2013 y 2019	5,8 %
A partir de 2019	3,1 %
No lo sé, lo desconozco	11,1 %
Nueva	23,5 %
Base	1025

Figure 5. Year of construction of the current home.

Therefore, when we talk about concern for acoustic insulation, we can see that 34.6% of respondents already live in homes built to DB HR and therefore have acoustic insulation built into their construction solutions.

Nevertheless, acoustic insulation is an important issue that stands out despite the fact that they have homes built to DB HR specifications.



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Reflecting this concern for acoustic comfort in homes, the UNE 74201 standard was published in September 2021. "Acoustics. Acoustic classification scheme for buildings", which establishes a classification scheme that makes it possible to characterise the level of acoustic comfort in newly constructed buildings and to evaluate the acoustic conditions in existing buildings, offering the possibility of improving them in future renovations. A building that complies with the Technical Building Code in DB HR is generally classified in Class D according to the UNE 74201 standard; this classification is based on sampling carried out in the most unfavourable rooms of the building, taking into account the performance of airborne noise insulation, impact noise, facades and installations.

As noted in the survey, this Class D rating is below what almost half of respondents consider to be acoustic comfort, so there is still room for improvement in new buildings and refurbishment of existing buildings.

3.2 Possible modification of DB HR

The Administration is currently considering changing some aspects of the basic noise protection document.

Table 1. Current insulation limits and possible changes

Constructive element. Protected space	Current requirement	Possible modification
$D_{nT,A}$ room with different unit of use	50 dBA	52 dBA
$D_{nT,A}$ room with installations or activities	55 dBA	57 dBA
$L'_{nT,w}$ room with different unit of use	65 dB	60 dB
$L'_{nT,w}$ room with installations or activities	60 dB	55 dB

With the increase in the requirements for protected spaces, the acoustic classification of the building would move from class D to class C or B. Therefore, the possible modification of DB HR is an advance compared to the current requirements, but it still has room for improvement, as it falls short of the acoustic classification of the building of class A, which would provide optimal acoustic comfort to the users.

In parallel with this modification of the requirements in terms of insulation limit values, the tables of the simplified option for checking DB HR should be modified in the part that concerns plasterboard systems, which are excessively increased in the current standard. In this case, the modification concerns the systems used for internal partitions, where the minimum insulation requirement and the minimum mass must be adapted to the current systems and to the tests made by UNE 102045 test standard "Procedure for monitoring and characterizing the assembly of gypsum plasterboard systems for airborne sound insulation tests in the laboratory".

The change in requirements for partition walls in self-supporting frame systems may change the tables associated with these systems in the simplified option to adapt them.

Table 2. Modification of simplified option tables for self-supporting frame elements

	Current requirement	Possible modification
Internal partitions	33 dBA	39 dBA

3.3 Need to adapt support documents to DB HR changes.

This regulatory change in DB HR must also be reflected in the various support documents and programmes, so that the solutions proposed in them are in line with the current situation of the systems and also with the new insulation values.

3.3.1 DB HR Application Guide.

This guide, which contains interpretation criteria, comments and application examples to assist technicians, develops the DB HR principles and regulatory texts so that they must be adapted to global requirements and to the new Simplified Option tables.



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3.3.2 Catalog of Construction Elements (CEC)

The CEC provides users with a database of information on the hygrothermal and acoustic performance of generic building components. This catalogue was created in conjunction with the introduction of DB HR to assist designers in incorporating systems into acoustic studies for which acoustic tests were not available.

Since the publication of the CEC, there has been an update in the testing of different construction systems, with the development of the above-mentioned UNE 102045 standard, which avoids the dispersion of acoustic test results in plasterboard systems and reduces uncertainty between laboratories.

Therefore, the CEC should also be modified and adapted to the new values of the tests carried out with the new protocol, in order to provide more reliable results to acoustic technicians.

4. ACOUSTIC CALCULATION SOFTWARE. SAINT-GOBAIN ACUSTIC

There are several softwares on the market that perform the calculation of the acoustic insulation in buildings using the General Option of DB HR, taking into account all the spaces, construction solutions, types of joints... These programs offer a complete acoustic study of the building, which allows an in-depth analysis, but requires modelling the building in all its spaces and construction solutions, which requires in-depth knowledge of it and also a certain technical knowledge, in addition to being time consuming. Therefore, this calculation using the General Option is more common when dealing with buildings of a certain size or relevance.

Most residential buildings, such as those covered by the Saint-Gobain Barometer, are calculated using the Simplified Option, which offers a simpler calculation model based on tables depending on the construction configuration used and allows the building to be modelled more quickly without requiring extensive acoustic knowledge.

In 2022, the Saint-Gobain Acoustic software will be launched as an add-on to the Ce3X building energy certification programme, with the idea of making it easier for technicians to choose different acoustic solutions in the building, checking compliance with the DB HR using the Simplified Option and also performing a pre-classification of the building using the UNE 74201 system, so that in

addition to compliance with the regulations, the technician can have an idea of what class of acoustic comfort will be achieved in the building.

4.1 Introduction of Acoustic data of the building in Saint-Gobain Acustic.

The Saint-Gobain Acoustic add-on is integrated into the Ce3X software and allows the user to carry out both the energy certification of the building and the verification of compliance with CTE DB HE and DB HR without having to model the building in different software.

Within the add-on, different tabs are opened where the technician must fill in the conditions and construction solutions of the building:

- Acoustic description of the building
- Vertical indoor systems
- Horizontal indoor systems
- Envelope (facades, roofs and external floors)
- Reverberation and facilities

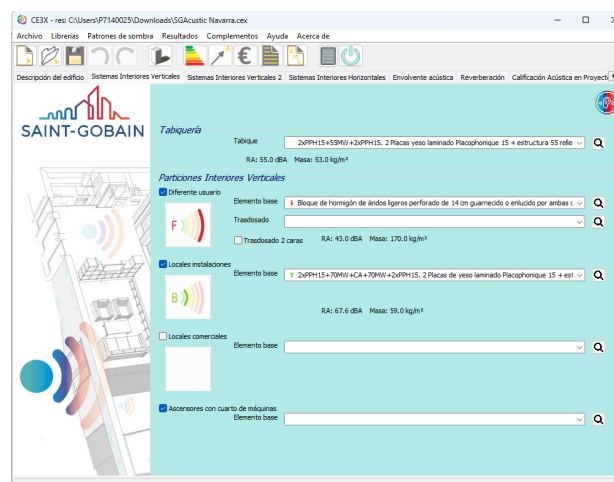


Figure 6. System introduction screen.

The software has a database of acoustically characterized construction solutions, including the CEC and Saint-Gobain acoustic solutions. In addition, the user can introduce their systems with tests or perform the calculation of their own systems.



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Creación elemento: Partición Interior Vertical

Partición Interior Vertical

Tipo de partición: Tipo 3 De entramado autoportante.

Estructura Autoportante: simple

Nº Placas: 1

Espesor estructura PVL [mm]: 55

Espesor PVL [mm]: 15.0

Descripción del sistema: Tabique Isover - Placo formado por placa Habito 15 con estructura simple 85/55 (Habito 15 + 55 + Habito 15) a 400 mm con lana mineral Isover arena APTA

Masa [kg/m²]: 29.9

RA [dB]: 43.2

Aceptar Cancelar

Figure 7. Introduction of new systems with values known to the technician screen.

Librería cerramientos: creación de elementos

Cerramientos

Partición interior vertical: Cálculo del aislamiento acústico por capas

Nombre: X-Ray protection (2 X-Ray 15 + 55 + 2 X-Ray 15) con lana mineral Isover arena APTA

Características del cerramiento

Verticales (Materiales ordenados de exterior a interior); Horizontales (Materiales ordenados de arriba a abajo)

Material	Grupo	Masa (Kg/m²)	Espesor (m)	AFR (kPa·s/m²)	Edm (N/m²)
PLACO X-RAY PR...	Placo	18.0	0.0125	-	-
PLACO X-RAY PR...	Placo	18.0	0.0125	-	-
ARENA APTA	Isover	0.9	0.045	5.0	0.11
PLACO X-RAY PR...	Placo	18.0	0.0125	-	-
PLACO X-RAY PR...	Placo	18.0	0.0125	-	-

Características del material

Grupo de materiales: Placo

Material: PLACO X-RAY PROTECTION

Tipo de material: Material masivo

Espesor: 0.0125 m

AFR: - kPa·s/m²

Edm: - N/m²

SD: - MN/m³

Guardar cerramiento Modificar cerramiento Borrar cerramiento

Figure 8. Acoustic calculation construction system screen.

4.2 Checks and reports.

Saint-Gobain Acoustic carries out the verification of the CTE DB HR using the simplified option, using the tables and conditions defined in the basic document. In the case of different construction systems for the same use, the least favourable (with lower acoustic performance) must always be introduced in the software to ensure compliance with DB HR.

With regard to the acoustic classification of buildings, Saint-Gobain Acoustic carries out an estimated pre-classification based on laboratory tests of the construction

elements installed in the building, in accordance with option B of the standard for classification using "in situ" measurements for subsequent classification.

The reports generated by the tool are as follows:

- Acoustic report. With the data of the property, the construction solutions used in the building, and different checklists for the solutions with important points to be checked in the construction site from an acoustic point of view, both construction systems and the facilities.
- Justification Simplified Option DB HR with the format of the Basic Document.
- Acoustic pre-classification according to UNE 74201. Partial and global.
- Building Acoustic label. Similar in format to the energy certification, this label allows, at a glance, to know the acoustic classification of the building, partial and total.

Informe Acústico

Informe de PVL de doble periferia adosada a una placa aislante

Figure 9. Acoustic report.

Justificación DB HR

Criterio	Valor	Cumplimiento
...

Figure 10. Justification DB HR.



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Figure 11. Acoustic pre-classification.



Figure 12. Acoustic label.

5. CONCLUSIONS.

There is a demand from users to achieve adequate acoustic comfort in their buildings, to increase the current requirements for acoustic insulation for both airborne and impact noise and for installations in current dwellings.

The future modification of the CTE DB HR goes in this direction by increasing the requirements to achieve a C or B classification in the Acoustic Classification of Buildings. These new values, although still far from an A classification, will allow greater comfort.

These changes must also be reflected in all the supporting documents of the CTE (Application Guide and Catalogue of Construction Elements), so that technicians have tools to design buildings from an acoustic point of view, both in the design phase and in the execution phase.

In addition, manufacturers of building materials must develop their systems to offer solutions adapted to the new acoustic requirements.

The use of simple calculation tools, such as Saint-Gobain Acoustic, allows the democratization of acoustics, making it more accessible to technicians involved in projects and construction.

6. REFERENCES

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