

# Improving acoustics

**For better learning environments**



**Ecophon**<sup>®</sup>  
SAINT-GOBAIN

A SOUND EFFECT ON PEOPLE



# The natural environment

## The model for learning spaces

Over thousands of years, the human sense of hearing evolved for an outdoor, natural environment. Today we spend almost 90% of our time indoors, and so are exposed to many unnatural sounds.

This has a significant impact on our ability to concentrate, communicate and learn. To improve the sound environment in classrooms we should strive to simulate the natural, outdoor environment.

### Knowledge and wellbeing

An optimal sound environment is a basic necessity if all students are to be able to learn effectively. The modern classroom puts greater emphasis on group communication, so the acoustics of the teaching environment should be based on how people experience sound and the way it affects them, not just on meeting formal standards. When the sound environment provides the best possible support for students and teachers, it will increase both comfort and the quality of learning.

### The evolution of education imposes new demands

In recent years there has been a move away from 'traditional' lecture-style teaching, towards a communicative classroom where the teacher is seen as a facilitator of different learning styles to get the best from each student. A modern learning environment is expected to motivate students to be more actively involved in their education, which leads to increased communication – and potentially higher sound levels.

### The acoustic challenge

Ecophon acoustic ceiling and wall panels are designed to meet this acoustic challenge, by absorbing sound, reducing noise levels and excess reverberation within the teaching space. Studies have shown that these effects improve teacher well-being, pupil comfort and inclusiveness can improve behaviour and may lead to improved academic performance.



# Supporting better learning environments

A classroom usually has enclosed parallel walls and a hard floor, with little upholstered furniture and curtains. Without appropriate acoustic treatment the sound bounces around in the room, and conditions are far from those in the natural outdoor environment. So the challenge is to control unwanted sound and echoes to make listening and speaking more comfortable for students and teachers, without limiting communication.

## Meeting the standards – a minimum

Government set standards are a good start, and are based on the amount of sound absorbed, with the use of reverberation time as a measure. Separate standards for pupils with special educational needs require enhanced acoustic performance, and may apply to areas outside of the classroom. Compliance with standards must be seen as the absolute minimum to ensure that a classroom is acoustically fit for purpose. But to ensure success, we should go beyond these standards.

## Going beyond standards – aiming for the optimum

Creating the best possible conditions for students and teachers requires an understanding of how people experience sound in classrooms. This involves how sound is reflected in a room, how speech consists of different sound frequencies and how it is understood, and the way people respond both physically and mentally to different sound situations. To be able to see the whole picture, we generally look at four acoustic qualities; sound strength, speech clarity, reverberation and low frequency absorption.

## Benefits for students and teachers

Addressing all four acoustic parameters gives numerous benefits for people experiencing the sound environment in the classroom. For example:

- Lower sound pressure levels improve listening comfort and conditions for concentration and short-term memory, and reduce mental stress.
- Removing late horizontal reflections improves speech clarity, especially in teaching situations with one-way speech.
- Improved speech clarity enables information to be more easily understood.
- Comfortable speaking reduces stress for the teacher and relieves strain on the vocal cords.
- Increased low-frequency absorption makes both speaking and listening more comfortable in multi-use classrooms, and may be required to reach SEN standards.
- Good acoustics may improve student's interaction, attitudes and behaviour, which have a positive effect on teachers' working environments and the school's overall performance.



### Sound strength

How strong the sound is in the room.



### Speech clarity

How speech is perceived in the room.



### Reverberation

How quickly sound energy dissipates by 60dB in the room.



### Listening comfort

How low-frequency sound affects listening comfort.



## Measuring the three most important acoustic parameters in classrooms

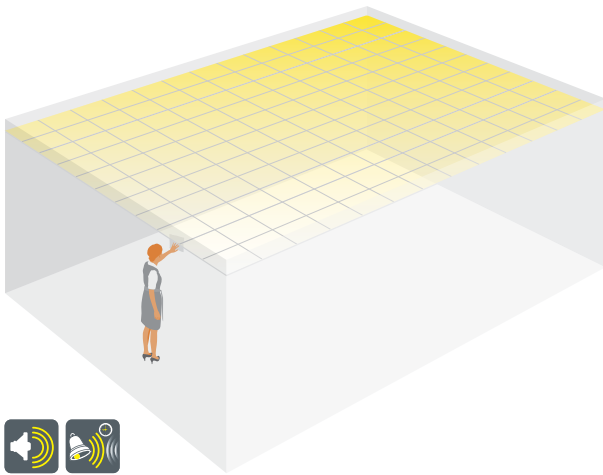
**Sound strength** –  $G$  (dB) measures the extent to which a room amplifies the sound from a sound source, compared with measurements in a laboratory with no sound reflections.

**Speech clarity (definition)** –  $D50$  (%) is the energy of all useful reflections of the direct sound, which enhance speech clarity, divided by the total energy including the direct sound. The higher the value, the better the speech clarity.

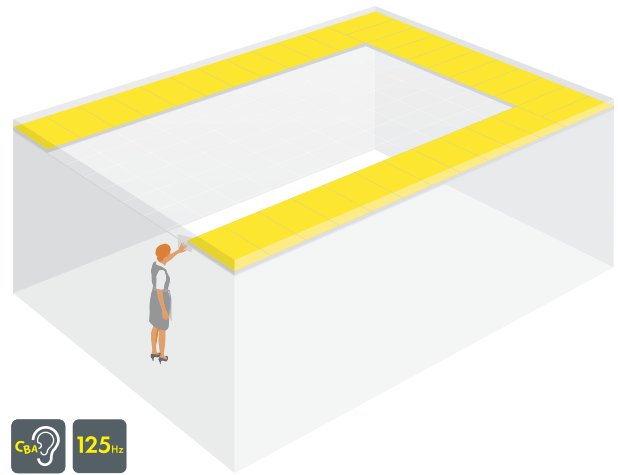
**Reverberance** – Reverberation time,  $T$  (sec), indicates how long it takes for the sound to drop by 60 dB after the source stops emitting sound.

According to ISO 3382-1 and ISO 3382-2.

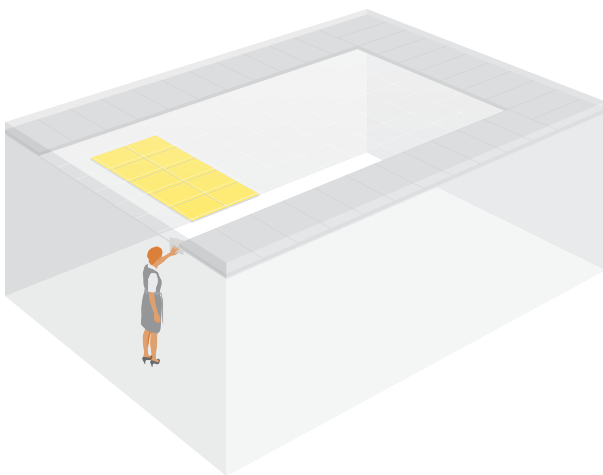
# Components to secure acoustic comfort in classrooms



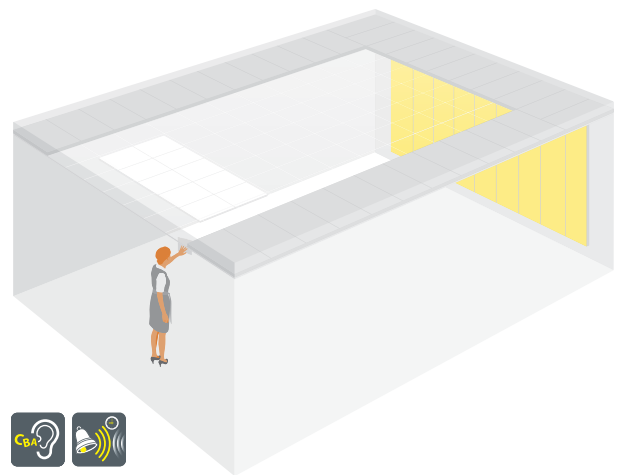
An Ecophon acoustic ceiling is a first and important step towards the best possible sound environment. Its main effect is to reduce reverberation and decrease sound levels.



A low-frequency absorber, Ecophon Extra Bass, is placed on top of the acoustic ceiling in a U-form covering approximately 45% of the ceiling. This increases the absorption of noise at 125 Hz and will greatly improve listening comfort and speech clarity.



To support speaker comfort, panels can be installed as a reflector above the teacher. \* These panels are part of the acoustic ceiling. When teachers receive speaker feedback from the reflector they do not need to raise their voices to feel properly heard.



With Akusto Wall Panels positioned on the back wall, the horizontal sound reflections will be reduced, which will increase speech clarity and further reduce reverberation.



Ecophon Extra bass

ECO

Ecophon Extrabass

Ecophon  
SAINT-GOBAIN

Ecophon  
SAINT-GOBAIN

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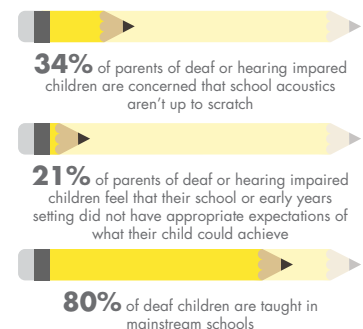
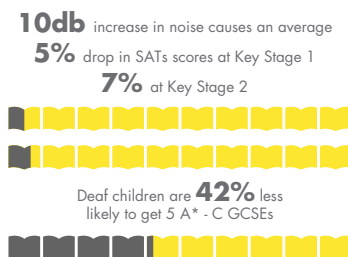
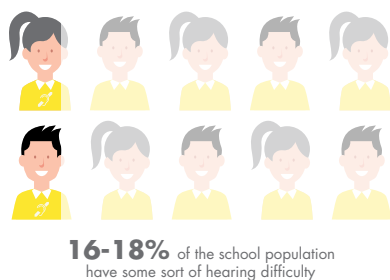
# Easy to install

## And ready to make a difference

### Ecophon's systems are designed to work

All of our systems are designed with their final environment in mind. So our range includes surfaces that are easy to clean, tiles that offer impact resistance where required and even solutions that can be clipped down or locked in place for spaces that are likely to experience more challenging behaviour.

This attention to detail extends to the installation process. Ecophon's systems are simple to fit on site, with clear installation diagrams, templates and datasheets easy to access via our website at [Ecophon.com/uk](http://Ecophon.com/uk). If there are any questions, our UK based Specification and Technical Support teams are available to help.





# Make a sustainable choice

## Beyond the acoustics

### You can hold us responsible

We are happy to share with you full transparency of our products' environmental impact, the efforts we're making to reduce it and where we haven't yet reached our ambitious goals. We've come a long way and lead the industry in many areas of both eco and auditory-friendliness, but we know there is still more we can do.

All of our systems are manufactured with Ecophon's unique 3rd generation glasswool, containing more than 70% recycled glass and using a plant-based binder. It contains no added formaldehyde, meets the most stringent emissions regulations and can be recycled at the end of its life, making any Ecophon ceiling a highly sustainable choice.

### Fine-tuning every single step

You can't improve anything until you understand it. That's why we do in-depth lifecycle analyses to uncover every aspect of our products' environmental impact. Armed with that knowledge, we are pushing ourselves to do better, from sourcing raw materials to finding responsible ways to handle and use waste.

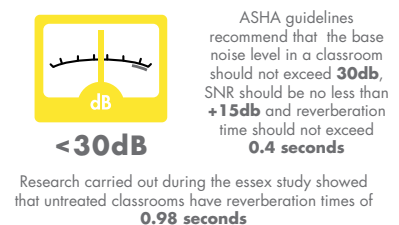
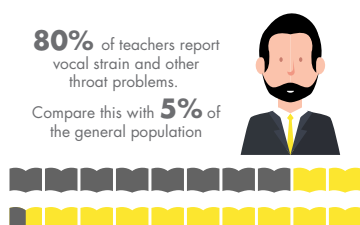
### We met our renewable energy goal – 8 years early

We thought we were setting an ambitious goal when we planned to complete our transition to renewable electricity by 2020. Things moved a bit more quickly than that. In 2012, our plants switched over to hydro power for most of their energy needs. But that isn't to say our production process doesn't have room for improvement. We still want to bring down the amount of energy that goes into the process. That's why we constantly re-evaluate each step and find new ways to squeeze the most out of every last watt.

### We have closed the loop

We don't ride off into the sunset when installation is complete. We take responsibility for the whole lifecycle of our products. From 1st January 2016, we will accept the return of all 3rd generation panels and turn them into EcoDrain™.

**For more details about our sustainability journey, visit [www.ecophon.com/uk](http://www.ecophon.com/uk)**





A SOUND EFFECT ON PEOPLE

*Ecophon dates back to 1958, when the first sound absorbers manufactured from glass wool and designed to improve the acoustic working environment were produced in Sweden. Today, as part of the Saint-Gobain Group, the company is a global supplier of acoustic systems that contribute to good room acoustics and support a healthy indoor environment, with the focus on offices, education, healthcare, retail and industrial manufacturing premises.*

*Ecophon's efforts are guided by a vision of earning global leadership in room acoustic comfort through the design and manufacture of sound-absorbing systems that enhance end users' performance and well-being. Ecophon maintains an on-going dialogue with government agencies, organisations and research institutes, and is involved in formulating national standards in the field of room acoustics.*

*Ecophon contributes to a better working environment wherever people work and communicate.*

[www.ecophon.co.uk](http://www.ecophon.co.uk)

