



**5** facts about

# Acoustics and stone wool



Not all noise is bad, as any lover of loud music would agree. But unwanted noise, otherwise known as noise pollution, poses a real threat to human health and wellbeing.

Noise can affect your sleep, raise your heart rate and blood pressure, and lead to cardiovascular diseases, diabetes and cognitive impairment with the potential to take years off an average person's life. Every year, according to the European Environment Agency (EEA), 10,000 premature deaths in Europe can be attributed to noise. In terms of economic impact, noise from road and rail traffic in Europe is estimated to cost EUR 40 billion per year.<sup>1</sup>

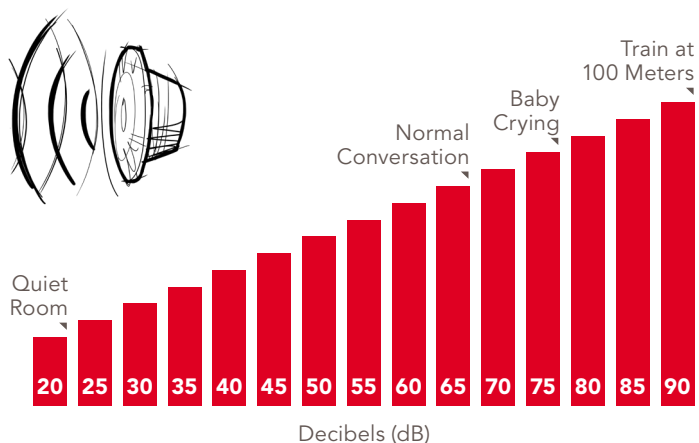
# 1

## What is sound and how is it measured?

At its most basic level, sound is a very small and very rapid fluctuation in air pressure above and below atmospheric pressure. All sounds – a ventilation system, a vibrating cell phone, road traffic – operate by this principle. The ear is very sensitive to sound sources and the range of pressure vibration from the weakest to the loudest sound heard is extremely large.

The ear doesn't experience sound in a linear fashion, however. Instead, a logarithmic scale is used with a measure of energy in decibels (dB). To the ear, a sound heard at 60dB only needs to decrease to 50dB to be perceived as being half as loud.

The figure below gives you an idea of how loud things are on the decibel scale and an overview of the two primary metrics used to evaluate the acoustical in buildings.



# 2

## Good building acoustic design is important for our wellbeing

The acoustic environment of buildings has a significant impact on our comfort, productivity and wellbeing, for example:

- In hospital environments, noise control is very important for patient recovery as "unwanted sound" can increase heart rate, blood pressure and respiration rate.
- In many classrooms the speech intelligibility can be 75 percent or less, meaning that students cannot hear every fourth word from the teacher's mouth<sup>2</sup>.
- At work, better acoustics, particularly in open-plan offices, reduce distraction and improve productivity by two to three percent, worth up to EUR 1,600 per year on average per person<sup>3</sup>.

**Sound Absorption:** Ability of a material to absorb rather than reflect sound waves.

**Sound Transmission Loss:** The decrease in sound energy expressed in decibels of airborne sound as it passes through a building's construction.

1 European Environmental Agency, European briefings: Noise, available via <https://www.eea.europa.eu/soer-2015/europe/noise#note6>, accessed at 24 Jan.2020  
 2 Classroom Acoustics 1, 2000 [https://acousticalsociety.org/wp-content/uploads/2018/02/classroom\\_acoustics\\_1.pdf](https://acousticalsociety.org/wp-content/uploads/2018/02/classroom_acoustics_1.pdf)  
 3 Buildings performance Institute Europe (BPIE), "Building 4 People: Building the business case for better office, school and hospital buildings in Europe", available via [http://bpie.eu/wp-content/uploads/2018/12/market\\_paper\\_031218.pdf](http://bpie.eu/wp-content/uploads/2018/12/market_paper_031218.pdf), accessed at 24 Jan. 2020



# 3

## Construction materials affect the acoustic environment

Every element of a building's construction contributes to its acoustic characteristics. It's more than just walls and ceilings. Also shapes, surfaces, furniture, light fixtures, mechanical systems and materials used in construction have an impact on a building's acoustics.

When the acoustic properties of construction materials are not considered during the specification process, the result is likely to be a poor acoustic environment. As an example, if the surface of the construction material allows sound waves to bounce back into a space, it can create a very noisy interior environment. A sound-absorbing material, on the other hand, can reduce the ambient sound levels and help prevent noise travelling from one space to another.

# 4

## Stone wool contributes to good room acoustics

Room acoustics focus on sound behaviour inside a room and most often concern two aspects:

- sound absorption: It is the ability of a material to absorb rather than reflect sound (think about the difference between throwing a rubber ball against a wall vs. you jumping into a pile of pillows).
- reverberation time: It is a measure for how long it takes for a sound to 'die out' after the source of it has disappeared.

Depending on the application, the acoustic properties of the building materials you specify, and use will play a significant role in overall indoor acoustics. Stone wool is a fibrous material that functions as a sound absorber and contributes to improved room acoustics. It does that by absorbing and dampening sound waves.

# 5

## Stone wool reduces sound transmission

**Through partition walls:** Good sound absorption properties and high air flow resistivity make it an ideal material for such application. Under ideal conditions you only hear 50 percent of the noise coming from other rooms compared to the same partition wall without insulation.

**Through facades:** In addition to a sound reducing window, installing ROCKWOOL stone wool can substantially improve the sound insulation by up to 15% according to our internal test results.

**Through floors:** Stone wool is a solid solution for reducing noise transmission between floors of a building. Measurements have shown that floors with 20 mm stone wool slabs underneath can reduce the perceived impact noise by up to eight times.

**Bouncing off ceilings:** Research has shown that workers exposed to open office noise are 15 percent less productive. The use of ceilings that both absorb and insulate noise can block sound emitting from the room next door or the floor above, thus lowering distracting influences of the work place while delivering the privacy necessary for sharing sensitive information.

**And even roofs:** Impact noise from a roof, such as heavy rain, makes it difficult to teach in schools or concentrate in offices. If, however, you insulate a metal roof with stone wool, you reduce the noise from the rain by 50 percent compared to some other kinds of insulation.

**After reading these facts on the acoustic performance of stone wool, you should now be able to make informed decisions on the insulation materials you are installing.**