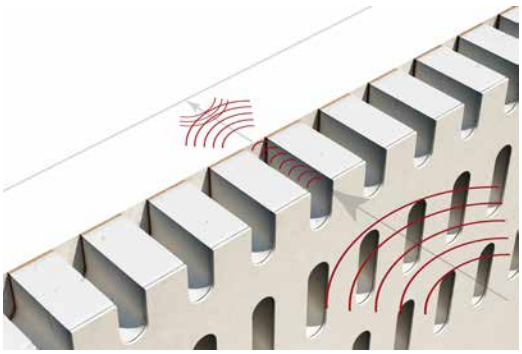
HOW SOUND WORKS

ABSORPTION



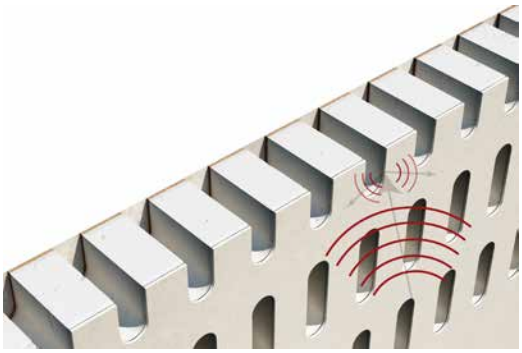
Knauf Danoline acoustic ceilings absorb the sound waves in three ways: by the vibrations of the acoustical tiles, by the resonance created in the perforation holes and by the acoustic felt backing.

When a tile is hit by low frequency sound waves it vibrates, thereby reducing the energy of the sound waves. The result is absorption of low frequency sound, also called membrane absorption. Perforation holes create resonance in the acoustic tile and act sound absorbing on the mid-range frequencies.

The acoustic felt on the back offers additional air resistance to the sound waves that pass through the perforation holes and absorb the high frequency sound. In addition, the acoustic felt smoothes out the sound absorption across the frequency range.

Gypsum-based sound absorbers thus offer broad-band sound absorption across the frequency range and ensure optimal room acoustics.

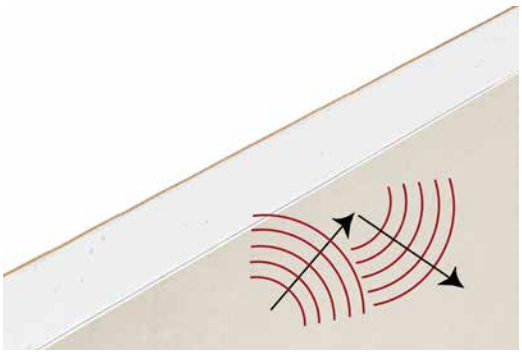
DIFFUSION



In addition to absorbing the sound waves, the perforation holes in a gypsum tile also create sound diffusion. The sound diffusion is enabled thanks to the complex structure of the perforated tile, contrary to e.g. a non-perforated gypsum tile or a fibrous absorber.
The sound waves hitting the edges of the perforation holes are broken into smaller fragments and dispersed in different directions, thereby leaving some the sound energy in the room and creating a more comfortable acoustic environment.

The built-in ability of a perforated tile to diffuse sound also increases its ability to absorb sound. This is due to the fact that the sound waves are spread across a larger surface which ultimately increases their chance of being absorber by the perforation holes.

REFLECTION



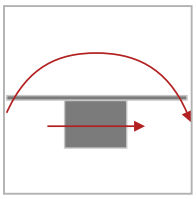
Due to the hardness of the gypsum tile, it is also able to reflect some of the sound waves in the room. These waves are reflected by the non-perforated parts of the tile, the perimeter border around the perforated area in particular.
Non-perforated tiles offer a high degree of reflection, whereas their ability to absorb sound is limited to the membrane absorption.

SOUND REDUCTION

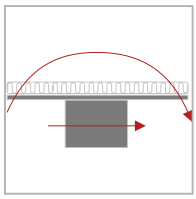
Thanks to its high density, a gypsum tile is able to reduce the sound between rooms. Due to its ability to vibrate, the tile naturally reduces the sound in low frequency range.

In addition, when coupled with soft mineral wool, which is sealed in plastic bags and fitted as the backing, the tile also offers mid- and high frequency sound reduction.

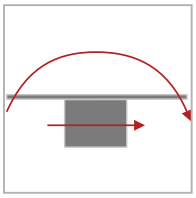
The sound reduction in continuous ceiling constructions is measured in accordance with EN 20140-9 and ASTM no. E1414-07.



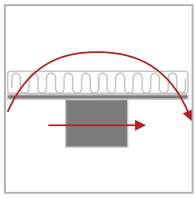
Sound reduction in ceiling construction, no mineral wool backing, **non-perforated tile**, 200 mm suspension 35 dB D,nf,w



Sound reduction in ceiling construction, 25 mm mineral wool backing, **perforated tile**, 200 mm suspension 36 dB D,nf,w



Sound reduction in ceiling construction, no mineral wool backing, **perforated tile**, 200 mm suspension 23 dB D,nf,w



Sound reduction in ceiling construction, 50 mm mineral wool backing, **perforated tile**, 200 mm suspension 41 dB D,nf,w