SOUND – ACOUSTIC ABSORPTION – FOOTSTEP SUPPRESSION – DRUMMING SOUND

Definitions

To make it easier to understand the descriptions of acoustic absorption and footstep suppression, some basic terms are explained below:

Sound. Consists of variations in pressure which are propagated through the air as waves. When sound waves hit a surface (wall, floor, ceiling), a smaller or larger part is reflected back into the room, where it mixes with the direct sound from the sound source.

Noise. The common term for undesirable sound.

Structural sound. The generic term for sound waves that are propagated in solid structural parts as a result of the direct mechanical effect of another structural part. Thus, structural sound occurs when we slam a door or stamp on the floor, or when a machine is being used.

Sound pressure level. An expression of the sound level in relation to the faintest audible sound. Sound is measured in decibels (db), which are a logarithmic measure of the ratio between two sound pressures.

Thus, for example:
- A difference of 60 db means that the ratio between two sound pressures is 1000 : 1
- A difference of 40 db is the ratio 100 : 1
- A difference of 20 db is the ratio 10 : 1

The sound pressure level is measured by a sound pressure meter.

Frequency

The human ear hears sounds of different pitches differently. The pitch (frequency) is measured in Hertz (Hz). 1 Hz is equal to one cycle per second. The higher the Hz value, the higher the tone. Sound-proofing in buildings focuses especially on the 100-3200 Hz range.

Reverberation time

Reverberation, which is a measure of the time taken for a sound to fall in intensity, is closely connected with noise suppression. Reverberation time is the time it takes for the sound pressure level in a room - after the sound has stopped - to be reduced by a thousandth, i.e. by 60 db.

Acoustic functional requirements for textile floor coverings

The main functional acoustic requirements for textile floor coverings are:
- Together with the storey partition chosen, to provide adequate sound insulation between two floors.
- To ensure that the use of the floor does not create noise annoyance in the room or adjacent rooms.

The sound-proofing capacity of a carpet depends on three things:

1. Sound absorbance

The carpet's absorption coefficient, a, is the relation between the absorbing sound energy and all the sound energy that hits the carpet.

Thus, the absorption coefficient is 0 if all the sound is reflected and 1 when it is all absorbed.

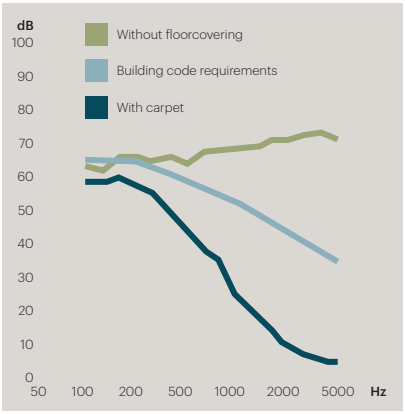
Carpets are good sound absorbers, i.e. very little of the sound that hits the carpet is reflected, most being absorbed.

The absorption capacity is greatest for high tones (high frequencies). At the same time, the general sound pressure level is reduced - noise is less annoying.

Speech is also absorbed, of course, but can nevertheless be heard better, since the reverberation time (echo) is less, and the most annoying noise is absorbed relatively strongly.

For a tufted, uncut carpet, the correlation between frequency and the absorption coefficient can be shown as follows:

2. Footstep suppression



A footstep is the sound made when walking on or making noise on floors, stairs, etc. By footsteps is meant the sound which occurs in the room under the storey partition.

Footsteps are perceived by the human ear through the air-borne sound (sound made when air vibrates, e.g. via talking or music) made by structural parts when they vibrate.

When footsteps are measured, it is the actual sound level in the room under the storey partition that is measured, while this is being subjected to a standardized knocking.

By footstep suppression is meant the difference between the footstep level measured under a storey partition with and without floor covering (carpet). The underlay plays an important role here, rubber and foam being better than felt.

In Germany, footstep suppression is expressed by a value called VM (Verbesserungs Mass = Improvement Value).

For a tufted carpet, the correlation between the footstep level and frequency can be as follows:

3. Drumming sound reduction

The sound made when you walk on or drag a chair over a hard floor is almost inaudible in a carpeted room.