Testing the acoustic properties of floors

Problem

When walking in a room a sound is emitted which is especially for parquet, laminate and stone flooring very specifically perceived. The perception of this sound in the same room is referred to as walking sound and in neighbouring areas as impact noise. Intensity and quality of this sound are key to whether this is perceived as pleasant, tolerable or annoying.
The emitted sound can be influenced significantly by the construction of the flooring.
Test methods for walking sound and impact noise are presented below.

Fig. 1 Excitation of the flooring (by hitting the surface) and sound emission

Walking noise – IHD Works Standard 431

Excitation of noise emissions by walking is the natural form of excitation for the walking noise phenomenon. Walking on a floor with ladies' high-heeled shoes is one significant case to be represented by the walking noise test method.
As a result, the IHD Works Standard 431 method is characterised by a combination of controlled walking on the floor by a trained and experienced person and an objective measurement and evaluation of the noise emitted. The result of a test is the (absolute and relative) changing of the psycho-acoustic measurand "loudness" of the emitted noise (unit: sone or %) compared with a defined reference floor (Fig. 2).
Results of volunteer tests and experiments according to Works Standard 431 correlate very closely with one another. The method allows different floors (or underlays) to be distinguished well from one another and therefore has a high validity.

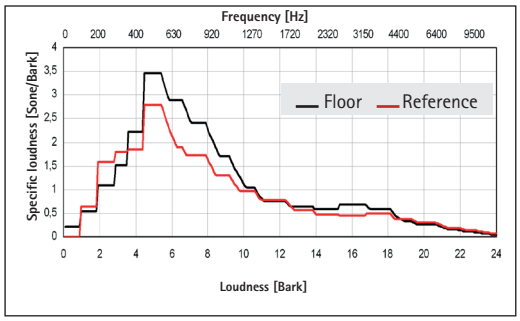

Fig. 2: Specific loudness of the noise emitted via impact excitation of a floor as a function of the frequency (and comparison with a reference floor)

Fig. 3: Microphone for testing

Impact noise – DIN EN ISO 10140-3 and DIN EN ISO 717-2

In the EPH's acoustic laboratory impact noise testings on different flooring systems are performed. In these tests, the floor is stimulated via so-called standard tapping machine (Fig. 4). Noise is not measured (by contrast with walking noise measurement) in the room in which the excitation occurs, but in the room below.

Both the raw ceiling (i.e. without a flooring laid) and the entire floor/raw ceiling structure (raw ceiling with flooring laid) are stimulated and measured. Conclusions regarding the ability of the floor to reduce impact noise emissions are derived from both tests. This is expressed via the so-called evaluated impact noise insulation ΔL_w (unit: dB).

Fig. 4: Standard tapping machine to excite noise per DIN EN ISO 140-8 respectively DIN EN ISO 10140-5 (impact noise)

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