Summary of the research project P 52-5-5.125-2036/19 in German, English and French

With regard to the protection goal of sound insulation against external noise, it is known that currently common component markings of external components and different types of external noise can lead to deviating internal levels in recreation rooms requiring protection. The common declaration of the exterior component with a weighted sound reduction index derived from the frequency spectrum according to DIN EN ISO 717 as a single-number value comes up against its limits. Correction summands for types of external noise were applied as a compensation. Spectrum adjustment values for the component properties are partially available, which, however, have not yet been applied in the central regulations for sound insulation.

From the point of view of building supervision, DIN 4109 is the central rule for the minimum requirements of structural sound insulation against external noise. This rule is currently intensely and controversially discussed among users and affected parties, as this is the first time that a correction summand for the external noise type of rail traffic has been included. Due to a lack of current research, it is not sufficiently certain whether further adjustments are necessary, as it has been about 30 years since the topic was dealt with in detail.

As a first step, the history of the development of sound insulation against external noise in German regulations was reviewed and exemplary comparative calculations were carried out. In a further step it was examined whether an improved verification by means of a frequency-dependent calculation seems possible. Since, on the one hand, the parameter for road traffic will continue to be calculated using only *A*-weighted sound levels and the calculation method in DIN 4109 is based on single-number values, this approach will not be pursued further. Even the inclusion of the spectrum adjustment values of exterior components does not indicate a universal improvement of the verification method.

In order to evaluate the current evidence, external noise spectra from sets of rules for the calculation of traffic noise and exemplary measurements were compiled within the scope of the research work in order to obtain an overview of expected external noise spectra. These were systematically evaluated with exemplary sound insulation spectra to determine the correction summands and from these, starting points for the revision of DIN 4109 were derived. Furthermore, the spectral influence of noise barriers was derived from the calculation method, influences were identified and a proposal for consideration was derived.

The investigation results in a proposal for standardization in principle and summarizes the still necessary need for investigation, discussions and decisions.