Correlation between Sound Insulation and Occupants' Perception – Proposal of Alternative Single Number Rating of Impact Sound

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Summary:

Traditionally, multi-family houses have been constructed using heavy, homogenous materials like concrete and masonry. But as a consequence of the progress of lightweight building systems during the last decades, it has been questioned whether standardized sound insulation evaluation methods still are appropriate.

An extensive measurement template has been applied in a field survey where several vibrational and acoustical parameters were determined in ten Swedish buildings of various constructions. In the same buildings, the occupants were asked to rate the perceived annoyance from a variety of natural sound sources. The highest annoyance score concerned impact sounds, mainly in the buildings with lightweight floors.

Statistical analyses between the measured parameters and the subjective ratings revealed a useful correlation between the rated airborne sound insulation and R0 w þ C50—3150 while the correlation between the rated impact sound insulation and L0 n;w þ CI;50—2500 was weak. The latter correlation was considerably improved when the spectrum adaptation term with an extended frequency range starting from 20 Hz was applied. This suggests that frequencies below 50 Hz should be considered when evaluating impact sound in lightweight buildings.

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