POLITECNICO DI TORINO
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Honors theses

The level of the impact sound insulation in residential building: comparison between measured and predicted values making reference to the Italian traditional building typology

by Francesca Borletto
Tutor: Arianna Astolfi
Co-tutor: Gianfranco Cavaglià

The main subject of the thesis is the comparison between the values of impact sound pressure level of tile-lintel floor obtained by measurement in works and the values of level obtained according to the method of estimate suggested by the standard UNI 12354-2. The method of estimate proposed by the standard is founded upon studies on building technologies which are typical of north European countries (concrete slab and lightweight walls) and which are very different from typical Italian building technologies; the thesis wishes to weigh if it is possible using the same method of estimate also in typical Italian building technologies.
Then the thesis relates synthetically the problems about the impact sound insulation and the use of floating floors.
Afterwards there is an analysis of the standard EN 12354-2 “Building acoustics – Estimation of acoustics performance of building from the performance of elements – impact sound insulation between rooms”. Three programs (using excel) of estimate of impact sound pressure levels have been realized using the method proposed by this standard: the first program according to the simplificated model of estimate, the second program which uses measured values or values from laboratory data bank like input data and the third program estimates the levels of impact sound pressure only beginning from physical characteristics of materials and products that have been used.
At the same time we have tried to find buildings where we could carry out the measurements in work in subsequent moments of building: only on the slab without flooring, on the slab with the light concrete castings for the systems on the floating floor without and with floor-tiles, also to estimate how the measured values were changing during the time. We decided to test 5 couples of superposed rooms in 2 flat buildings under construction. There are many technological differences between the tested buildings and we chose the rooms so that we could analyze different conditions: room on the corner of the building or in the middle with and without balconies; in both buildings there was floating floor. The rooms were analyzed carefully in order to in-put the most accurate data in programs of estimation and to find possible building anomalies.
In every receiving room, in different phases, in addition to the tests about the level of impact sound pressure, we also measured the vibration reduction index of the junctions between slab and walls, and structural reverberation time of walls of receiving rooms and of the separating slab.

These measurements made possible to compare the values obtained from anticipatory calculation with values obtained by measurement with different approximation.
The studies made possible to point out some limitations in applicability of the standard to the Italian traditional building typology as regards the model about different junction types, about the side of the rooms, and about the availability of data banks referring to materials that have been used.
The comparisons between predicted values and measured values point-out that predicted values in frequency are always a little different from measured data, but after the reduction at single index, the results on the slab with floating floor are always rather agreeing with measured results. On the other hand the comparison wit the results obtained with the simplificated model of estimate are always worse, probably because this method underestimates the lateral transmission of the sound.

For further information, e-mail:
Francesca Borletto: francescaborletto@virgilio.it