When the neighbor's noise makes its way through the walls

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Manufacturers of partition walls will possibly have to think further ahead in future than they have up to now: Christoph Kling shows in his dissertation at the Physikalisch-Technische Bundesanstalt (Germany) that the repercussion of sound from adjoining walls has previously been taken too little into account, even though it considerably affects the sound absorption capability of some walls.

Some people know more about their neighbors than they would like to. Whether the other tenants are just now listening to music, watching television, having visitors, vacuum cleaning or washing clothes - its not possible to not overhear these things, because sound finds its own way. Only the best possible insulation of the walls helps here. Manufacturers of partition walls will possibly have to think further ahead in future than they have up to now: Christoph Kling shows in his dissertation at the Physikalisch-Technische Bundesanstalt (PTB) that the repercussion of sound from adjoining walls has previously been taken too little into account, even though it considerably affects the sound absorption capability of some walls.

In the frame of a doctoral thesis basic investigations into damping effects in the field of building acoustics have been carried out. Special interest is paid to the damping of a partition wall in a laboratory test facility. This damping directly affects sound insulation which is the most important quantity in building acoustics.

In accordance with the results of earlier examinations, investigations into

damping effects in the field of building acoustics were applied to small downscaled models. These offer the advantage of the exact execution of construction and of freely selectable material properties and allow idealized constructions to be realized. Firstly, the necessary theoretical and experimental bases were provided for the design of the downscaled models. Extensive investigations into material properties led to the parameters required for the experiments and simulations. Thereafter, the individual effects that lead to the damping of the partition wall were determined as loss factors by experiment.

A simulation undertaken by means of statistical energy analysis (SEA) allowed detailed insight into the energies and power flows of the system in total to be gained. Both the experiment and the simulation showed in agreement that the power flowing from the facility into the partition cannot be neglected a priori as has been common up to now. Depending on the laboratory situation, effects which have been thought of as loss effects to date can be turned into gain effects for the partition.

Since the power flows are the basis for the treatment of loss factors which are the measurement quantities for the damping of a partition wall, the complexity of power flows requires a rethink. Previous conclusions and measurement procedures must be tested for validity. Particularly, the standard procedure for measuring the total loss factor, which is the main measurement quantity for damping in practice, was analyzed by a transient SEA simulation. In agreement with model measurements, it could be shown that, due to the complex power flow in a wall test facility, the total loss factor is determined as much too low for typical standard situations.

The insights gained about the damping of a partition wall in a building acoustics test facility explain previous discrepancies but also raise some new questions of a basic nature. In future, more effort will be required in practice to determine the influence of damping. This thesis offers a

starting point for that.

Source: Physikalisch-Technische Bundesanstalt (PTB)