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Summary

Evaluation of Mechanical Ventilation Systems intended for a Single Room for Residential Buildings and Determination of Expenditure Values for the Heat Transfer in Rooms as a Result of Reconstruction

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The Regulations on Energy Saving above all apply to new buildings. In case of reconstruction, the owners of houses are generally in need of more detailed information about the efficiency and cost-effectiveness of the existing technical solutions to save energy.

The replacement of windows, as an example of reconstruction, often results in a clearly increased air tightness of the structure and, consequently, causes a higher risk of mould growth. Therefore, when buildings are supposed to be reconstructed or single components of the structure are to be retrofitted, the use of mechanical ventilation systems intended for a single room is more and more discussed. The benefits are:

- easy retrofitting (no ductwork)
- comparatively low investment costs
- restriction to few and relevant rooms.

On the other hand, the information about the optimum energetic design, the most favourable arrangement in the room and a profitable operation are insufficient at the moment.

The research project provides practice-related data for the operation of mechanical ventilation systems intended for a single room (energy and ventilation efficiency, reduction and elimination of mould growth, indoor air quality). Parameters are derived for standard DIN 4701 part 10 and 12.

The second part of the study contains the computation of the effort that are necessary for the planned standard DIN 4701-12, in particular for the so-called heat transfer in rooms. The differences between older and new buildings with respect to modernisation and refitting are due to higher rooms, greater mass of radiators and the mostly open installation of pipes in the room.

There are no significant differences for radiators in older buildings when compared to new structures as regards overdimensioning, room temperature control, mode of operation and arrangement of radiators in the room. The influence of system temperatures and heat emission of pipes, which is modified through reconstruction, can be outweighed by additions to the expenditure values for new buildings. It is not necessary to modify the expenditure values for floor heatings.

The research project is based on methods of coupled simulation. This allows a holistic approach to the system 'building – technical installation – user' while individual boundary conditions are definitely varied. As a result, it is possible to take account of effects of structural physics, the air flows in buildings, installations and user behaviour thereby focussing on the actual practical requirements.