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Abstract

The energetic refurbishment of old residential buildings offers significant energy saving potentials. Since refurbished residential buildings remain for decades in the same energetic state, for a sustainable development, the refurbishment measures applied to these buildings should have the highest possible standard. Considering these facts, an ambitious standard of energy saving buildings is reasonable. For this work this means a heating energy consumption of the refurbished buildings of less than 15 kWh/m²a – which is the so called passive house standard. Therefore, the first part of the work will give an overview of different typical residential buildings, especially multi storey houses, in Germany and which insulation measures are necessary and possible to fulfil the requirements for passive house standard. Also the limits of insulation measures are discussed. However, a considerable large number of old residential buildings are located in the centre of the cities with the exterior walls exposed to high traffic noise levels. Therefore, it seems necessary that simultaneously with the energetic refurbishment the sound insulation is improved. In reality, while planning the energetic refurbishment of buildings, the sound insulation is totally disregarded. As a consequence one of the main aims of this research project is the analysis of optimization potentials for the noise protection of refurbished buildings with insulation measures according to the passive house standard. This includes all materials and constructions involved in the noise transmission process like walls, windows, roller shutter casings and ventilation systems. It is well known that if thermal insulation materials are attached to the solid walls, resulting resonance effects of the insulation system can reduce the noise insulation of the walls significantly especially in the low frequency range. Windows and ventilation systems are further weak points considering the noise protection of exterior walls. The second part of the work will give an overview of the sound insulation of the mentioned materials and building elements and the acoustical interaction of them in composite facades. Overall it is intended that the work can be used as a guideline for the integral planning of the refurbishment of old residential buildings including energetic refurbishment and the improvement of sound insulation.