

IMPACT OF ENVELOPE STRUCTURE ON THE SOLUTIONS OF THERMAL INSULATION FROM THE INSIDE

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Abstract

The article presents chosen issues related to the heat insulation of complex structure walls. Subjects covered in this study are building partitions that had been constructed in the so called “Prussian wall” technique and are located in the Upper Silesia region. Their technical condition as well as usable state are not satisfactory, especially in the light of thermal protection. One way of increasing their standard is insulating partitions. In case of historical monuments or rich architectural facades, typical insulation methods (the ETICS system) will not apply. Thus, the solution is to insulate external walls on the inside surface. This, however, causes moisture content difficulties, which means that steam diffusing through partition undergoes the process of condensation.

The authors suggest their own solutions to the problem of insulating diverse external partitions and base them on the research conducted in situ. They use The School of Music in Gliwice as an example. The measurement results obtained here were used in “heat-water content” modeling of walls for which WUFI 2D programme was applied. As shown in numerical analysis, the thickness and the sort of insulating layer have a key impact on the partition water content including wooden elements of construction. In case of walls that are 25 cm thick, the water content in the wall itself and wooden elements increased alongside the insulation material thickness, but it did not exceed the permissible level, otherwise wood degradation would ensue. For “Prussian walls” that are 12 cm thick and insulated on the inside we observe exceeding the level of 20% water content, which is critical for wood durability.

These results present elementary problems that occur when buildings with “Prussian walls” construction undergo thermo insulation. Restoration process must be a compromise between the need to retain the historical aspect of a building and the need to bring them to modern heat and usability standards. On the basis of numerical analysis, possible solutions, which meet these criteria, have been proposed.

Keywords: Prussian wall; Insulation from inside; Water content.