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Hygrothermal Assessment of Internally Insulated Prefabricated Concrete Wall in Polish Climatic Condition

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Abstract : Internal insulation of external walls is often problematic due to increased moisture content in the wall and interstitial or surface condensation risk. In this paper, the hygrothermal performance of prefabricated, concrete, large panel, external wall typical for WK70 system, commonly used in Poland in the 70’s, with inside, additional insulation was investigated. Thermal insulation board made out of hygroscopic, natural materials with moisture buffer capacity and extruded polystyrene (EPS) board was used as interior insulation. Experience with this natural insulation is rare in Poland. The analysis was performed using WUFI software. First of all, the impact of various standard boundary conditions on the behavior of the different wall assemblies was tested. The comparison of results showed that the moisture class according to the EN ISO 13788 leads to too high values of total moisture content in the wall since the boundary condition according to the EN 15026 should be usually applied. Then, hygrothermal 1D-simulations were conducted by WUFI Pro for analysis of internally added insulation, and the weak point like the joint of the wall with the concrete ceiling was verified using 2D simulations. Results showed that, in the Warsaw climate and the indoor conditions adopted in accordance with EN 15026, in the tested wall assemblies, regardless of the type of interior insulation, there would not be any problems with moisture - inside the structure and on the interior surface.

Keywords : concrete large panel wall, hygrothermal simulation, internal insulation, moisture related issues
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