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SAFE INSULATION FROM THE INSIDE AS A SOLUTION TO THE ENERGY AND CLIMATE CRISIS

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Abstract – Along with rapid climate changes, issues related to the energy efficiency and efficient use of energy are becoming more and more relevant in the EU. One of the energy-consuming sectors is buildings, which are responsible for about 40 % of the EU final energy consumption and 36 % of CO_2 emissions. In addition to this, the current energy crisis has acutely raised the issue of energy poverty. Therefore, one of the ways to fight with energy poverty and high energy consumption in buildings is insulation from the inside. However, warming from the inside is risky due to hygrothermal processes and mold risks. This study assesses the hygrothermal performance of masonry walls with 9 interior insulation systems exposed to different external conditions in the climate chambers. Masonry walls were tested in a steady cycle, a dynamic cycle, a dynamic cycle with rain and a steady cycle as drying. Also, an identical simulation of the hygrothermal process was carried out in the DELPHIN software to compare results of both testing methods. Both vapor-open and vapor-tight systems were chosen as insulation systems. The results show that the hygrothermal behavior of vapor-open and vapor-tight insulation systems is different under different test cycles regarding different vapor diffusion resistance of materials. Mathematical simulations results are different from the climate chamber simulations because of the change in material humidity that is changing during climate chambers simulations. From this it can be concluded that mathematical simulations do not give a complete vision of hydrothermal processes because they are dynamic, but in modelling the properties of materials are defined. The study provides valuable data on hygrothermal processes in different wall insulation systems from the inside.

Keywords – DELPHIN; energy consumption; energy efficiency; hygrothermal; relative humidity

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