XV International Conference on Durability of Building Materials and Components
DBMC 2020, Barcelona
C. Serrat, J.R. Casas and V. Gibert (Eds)

Innovative Environment-Friendly Interior Finishing Technologies Resistant To Mold Growth

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Keywords: *Mold, Durability, Interior Finishing, Silicate and Lime System.*

1 Introduction

Fungi and the remediation of living quarters have been a problem that has accompanied mankind for many years. Exposure to harmful biological agents in the interior environment of living spaces has been identified by WHO (2007) as a significant health risk. Molds cause the biodegradation of building materials, reduce the aesthetics of the interior, destroy stored products and adversely affect the well-being and health of people and animals. They cause diseases such as: mycoses, mycotoxicoses and allergies (Guo *et al.* 2004). Molds develop on the surface, forming variegated mycelium deposits (Gutarowska and Piotrowska, 2007). Control of the occurrence of molds in buildings and its reduction requires a holistic approach to the construction and occupancy process (Radziszewska-Zielina *et al.* 2020). The use of comprehensive solutions consisting of the improvement of thermal and humidity conditions in interior spaces leads to the elimination or reduction of the causes of mold infestation. Using an internal insulation system comprised of Epatherm silicate-lime slabs is one such solution.

2 Materials and Methods

The proposed thermal insulation sheets contains silicone, which gives hydrophobic properties, making them more resistant to dampness and the development of molds. The study used 18 sets of 45 samples taken from climate boards of varying thickness with different finishes, which were treated with three species of mold in 9 climate (humidity and temperature) combinations. Mycological tests were carried out based on the prepared spores, in two types of media, which were sprayed on the tested samples. The inoculated materials were placed in chambers with three humidity and temperatures variants. When assessing the susceptibility of materials to mold, over 20,000 cultures were counted, while the total number of database records was about

82,000 in total, nearly 823,000 mold colonies were counted. The obtained results were subjected to a statistical analysis (ANOVA).

3 Results

All building materials can be a convenient substrate for the growth of mold caused their destruction. It is necessary to know the susceptibility of materials to overgrowth by molds, as well as the factors that facilitate this process (Amman, 2006). The presence of mold was most often observed on samples no. 7, 8, 9, 12, 13, 16, 17, 30, 32, 33, 44. Differences between the ability to grow mold in laboratory conditions were observed in the case of inorganic materials. The growth of molds on inorganic materials was low in, among others, samples 35 and 40. This indicated a lack of active mold growth, which resulted from the existence of conditions unfavorable for the development of these microorganisms, in particular the alkaline nature of materials *e.g.* a high pH value of around 12-14 (Andersson *et al*. 1999).

4 Conclusions

The factor significantly affecting mold growth is the moisture content of the building material. The obtained results show that variants number 35 and 40, with high vapor permeability (water vapor diffusion coefficient = 3), prevent the development of mold on their surface. Climatic boards, with silicone in their composition, which gives them hydrophobic properties, will be more resistant to moisture, and thus to the overgrowth of molds.

Acknowledgements

The project was supported as a part of the competition 3/1.1.1/2017 POIR 2014-2020 organised by National Centre for Research and Development of Poland (no. POIR.01.01.01-00-0535/17).

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