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The effect of building components on the environment and health

Hazards from windows and facades?

1 Introduction

The number of those suffering from allergies, that is human beings whose immune system reacts to certain environmental influences, has been on the rise in Germany since years. What is striking here is, above all, the sudden allergic reactions of human beings, who were not aware of any adverse effects so far. The increasing severity of the immune reactions and the diversity of the environmental influences coming into play are also abnormal. The causes for this development are being attributed, in most cases, to several different social, technical but even ecological changes in our way of life. Apart from foodstuffs, for example, the suspicion is increasingly falling on materials and products that human beings are surrounded by at workplaces and in residential areas. While there have been statutory provisions and inspections with respect to environmental conditions for workplaces since several years, such binding specifications have been available only to a very limited extent for personal and public residential areas.

Although enormous endeavours are being made to protect and preserve the environment, (see Figure 1), the impact of civilisation on air, soil and waterways can barely be prevented completely. All types of structures and buildings come up time and again in discussions as one of the sources of the entry of non-environmental substances into the soil and waterways. The actual waste water from industrial plants and residential buildings are subject to stringent requirements, and sewage treatment plants can at least restrict the entry of such substances into the environment to a minimum. Apart from this, waste water also occurs from weather-beaten surfaces of buildings, for which so far, there have neither been any restrictions nor any specific empirical values available.



Fig. 1 Protecting the soil and groundwater
(source: © Otto Durst, Fotolia.com)

Legislators, users, residents, owners and investors are placing increasingly more importance today on the least possible impact of buildings on the environment to the conditions indoors and also on the influences on the environment. Even the European Construction Products Regulation [1] contains relevant basic requirements of construction products since a long time.

The associated subjects have also been part of the Research initiatives in recent years at ift Rosenheim. The primary objective of the relevant projects was to investigate and identify the influencing parameters of different building components, analyse practical options for verifying the more stringent performance characteristics and to minimise the unfavourable impact on the environment by construction components and buildings.

2 Emissions in indoor air

The evaluation of emissions from construction materials and elements is gaining increasingly in importance. Based on the requirements stipulated by the Construction Products Regulation (CPR) – apart from several other performance characteristics – even a declaration on the respective potential emissions relevant for indoor air needs to be made in future for products for which the CE mark is mandatory. For this purpose, at the European level, horizontal test-related specifications are prepared by the technical committee CEN/TC 351 for all products covered by the CPR, and which will be used in the years to come as the basis of implementation within the respective product standards [2].

At present, work is being done intensively on a harmonised European method for evaluating the emissions of construction products. Apart from a range of commercial marking systems, however, some European countries have introduced their own regulations and evaluation systems. The implementation of these specifications is, in fact, not a direct constituent of the CE mark, but as soon as products are launched in the respective markets, even the national requirements prevalent there must be met and implemented.

The emission potential of construction products such as windows and interior doors has been analysed and evaluated (see Figure 2) within the scope of research projects at ift Rosenheim in the last few years. The aim of these projects was also to create a general data basis as well as to formulate procedures for selecting and removing test specimens and analysis, so that any potential amendments in the product standards in the future in this segment can be prepared meaningfully and practically [3, 4 , 5].

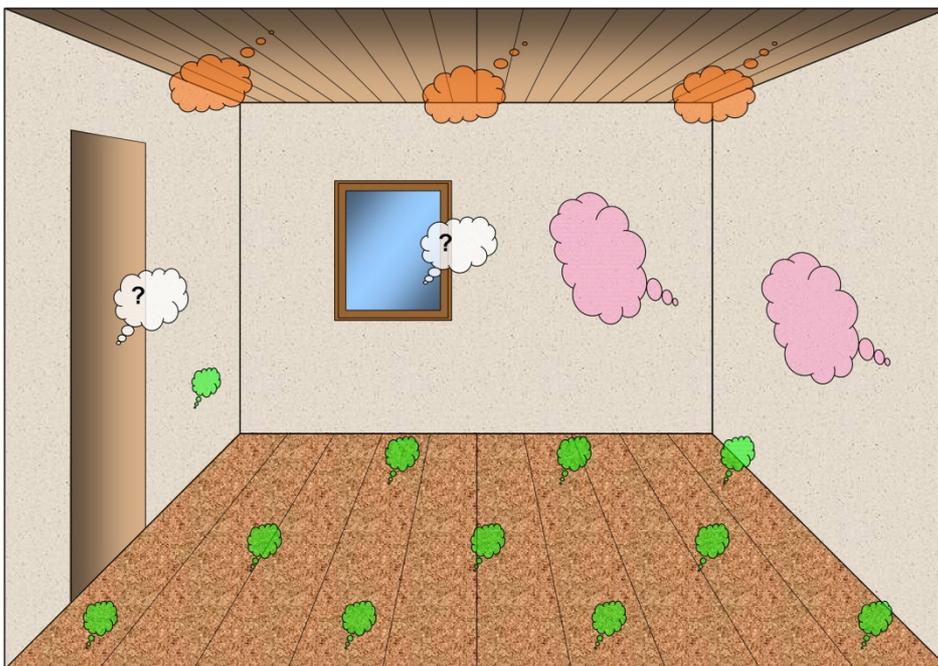


Fig. 2 Considering the emissions of various construction products

Windows and interior doors need to be classified as rather insignificant with respect to the emissions of hazardous substances compared to other construction products. Certain constituents and variations of these products may, however, completely fail the specified criteria or they may not achieve the best possible predefined class of emissions.

3 Impact of construction products on the soil and groundwater

Apart from the impact on the living conditions indoors, legislation, standardisation and conservation of Nature are increasingly demanding that even the impact of buildings and the construction products installed in them on the soil and groundwater be taken into consideration. This concerns substances and compounds that peel off from the surfaces of the building shell as a result of the impact of rain, solar radiation and temperature changes and escape into the natural surroundings. This subject was fortified by documentation and publications on construction projects, in which impurities reached surrounding waterways as a result of biocide coatings getting washed out from composite thermal insulation systems.

The European CPR (Construction Products Regulation) requires products subject to the CE mark to make a declaration even for this purpose in future. As in the case of emissions relevant for indoor air, horizontal test-related specifications have been compiled by the CEN/TC 351 Technical Committee at the European level, in order to transfer them subsequently to the product standards concerned.

So far, there have been barely any published findings on the relevant impact for construction products made of wood, plastic, metal and glass. In addition, since it is not clear whether test-related methods are suitable at all for these construction products, this is also being reviewed by a research project of ift Rosenheim in cooperation with the Fraunhofer IBP Holzkirchen. The aim is to gather empirical values for construction products from the materials mentioned and to work out practical and product-specific proposals for handling materials in this segment in the future.

4 Conclusion

In times of increasing scarcity of raw materials, changing consumer expectations and environmental requirements becoming increasingly stringent, even the windows, doors, gates and facade industry is facing great challenges. Our environment and our day-to-day life must be designed in such a manner that we human beings and our environment experience as low deterioration as possible. Hence, it is increasingly important for construction products and buildings to live up to the new relevant requirements and to be able to present their performance characteristics objectively and comparably.

The importance of these topics has been acknowledged by the industry; the research projects of ift Rosenheim are aimed at gathering experience and findings in these areas and to try to work out options for analysis and verification that are always practical and reasonable.

Apart from the extremely diverse technical and constructive requirements, even parameters on environmental stress over the entire product life cycle must increasingly be taken into consideration for product development. It is only in this way that the impact of building elements on the environment and health can be minimised and hazards can be averted.

Literature

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