

Risk mitigation for indoor air quality on example of construction products

Ana Maria Scutaru

*German Environment Agency
Corrensplatz 1
14195 Berlin, Germany*

SUMMARY

Most people in Central Europe spend the majority of the day indoors. The quality of indoor air is therefore very important for health and well-being. Construction products can be an important source of indoor pollution through their emissions. The implementation of health requirements to assess emissions of volatile organic compounds (VOC) from construction products into indoor air under the Construction Products Regulation has been under discussion since 2010. The necessary tools are now ready for use: The test method EN 16516 and the EU-LCI list (LCI: lowest concentration of interest) with harmonised reference values for the health impacts of VOC. This talk highlights challenges and chances of a harmonised European health evaluation for construction products emissions.

KEYWORDS

Indoor air quality, construction products emissions, EU-LCI, European harmonisation

1 INTRODUCTION

People in Central Europe spend the majority of the day indoors. A good indoor air quality is therefore crucial for a healthy life. Unfortunately, good indoor air quality cannot be taken for granted. It depends on many factors: Construction products and furnishings present in the building, indoor climate conditions (temperature, relative humidity), how and how often occupants ventilate, what they do in the rooms, and what household chemicals they use. Construction products can be an important source of indoor pollution through their emissions of volatile organic compounds (VOC).

The European Green Deal (EGD) launched by the European Commission in 2019 aims at solving the big environmental and social challenges of our time. Two major actions and initiatives of the EGD are the new renovation initiative and the zero-pollution ambition for a toxic-free environment. This ambitious policy framework set by the European Commission flags the importance of indoor air quality in buildings. In the future also the effects of the climate change on indoor air quality will become more drastic e.g. due to temperature increase indoors (Zhao, 2024).

2 CALL FOR HARMONISED CRITERIA FOR A RELIABLE EMISSION DECLARATION OF CONSTRUCTION PRODUCTS

The use of low emission construction products is a prerequisite for a good indoor air quality. This has become more important in modern construction and especially in energy-efficient buildings, where the rate of air exchange with fresh ambient air may be limited (Müller, 2017).

In the last years many efforts have been made to provide instruments for the enforcement of the Construction Products Regulation (CPR) Basic Work Requirement “Hygiene, health and the environment” for construction works. The goal is to provide information on the emission performance of the construction products in a harmonised format. The necessary tools are now ready for use: The test method EN 16516 Construction products: Assessment of release of dangerous substances - Determination of emissions into indoor air is available, fully validated and suitable for all construction products emitting VOC (EN 16516, 2020). The second tool, a first list with harmonised reference values for the health impacts of VOC, EU-LCI (LCI: lowest concentration of interest), was published in November 2023 (European Commission, 2023).

In the past years also many proposals were brought to the table on how to best declare the emission performance of construction products and how to define VOC classes for communication of test results. However, until today, no consensus could be reached between the European Commission and the EU Member States on this topic.

3 PROPOSAL TO ASSIGN AND COMMUNICATE VOC EMISSION CLASSES

To revitalize the discussions on a harmonised communication of VOC emissions from construction products the German Environment Agency (UBA) organised the international online conference ‘Limiting health impacts of construction products regarding VOC’ in April 2021 (<https://www.umweltbundesamt.de/en/international-conference-limiting-health-impacts-of>). The core of the conference was the discussion of a specific proposal for VOC classes and ways of application and implementation towards a future VOC declaration (Reihlen, 2021).

Four essential performance characteristics are suggested:

- Sum of EU-LCI ratios (R-value): For the health evaluation of emissions, reference values (EU-LCI) are set for individual VOCs. By dividing the reference room concentration of a compound by its corresponding EU-LCI value the EU-LCI ratio is established. Additive effects of VOCs are accounted for by summing up the individual EU-LCI ratios to a hazard index (R value).
- CMR_{VOC}: VOCs with carcinogenic, mutagenic or reprotoxic properties are assessed separately.
- Formaldehyde: This substance is evaluated individually because it is frequently measured in indoor air and included in many assessment schemes.
- TVOC: The sum of all emitted VOCs from a product according to the EN 16516 is determined. Measurement of TVOC is included in most assessment schemes and also as parameter in building certification systems.

4 CONCLUSIONS

A consensus for a quick and simple solution regarding information on VOC emissions of construction products is imperative (figure 1). The European Commission presented a new proposal for the communication of VOC emissions in June 2024 which will be discussed with the EU Member States in the next months. If health criteria for marketing of construction products in Europe cannot be implemented within the current CPR, other initiatives need to be tackled: Environmental Product Declarations provide important information on products and their application. So far, this means only declaration and no evaluation of data and VOC emissions were often not included to date. Digitalisation of the release of dangerous substances (Smart CE marking) in the context of the Building Information Modelling could also offer a possibility to quicker progress on this topic.



Figure 1: Example for a possible “translation” of information into VOC emission classes

5 REFERENCES

- EN 16516. (2020). Construction products: Assessment of release of dangerous substances - Determination of emissions into indoor air. EN 16516:2017+A1:2020.
- European Commission. (2023). *List of "Lowest Concentration of interest" (LCI) values 2023*. Retrieved from Publications Office of the European Union: <https://data.europa.eu/doi/10.2873/88989>
- Müller, B. M. (2017). *Indoor air quality after installation of building products in energy-efficient buildings*. Berlin: UBA Texte 73/2017, Umweltbundesamt.
- Reihlen, A. J. (2021). *Harmonised VOC emission classes for construction products - A tool to achieve healthy buildings*. Berlin: Dokumentation 05/2021. Umweltbundesamt.
- Zhao, J. U. (2024). Long-term prediction of the effects of climate change on indoor climate and air quality. *Environmental Research*, 243, S. 117804.