

Indoor air quality – steps forward beyond the framework of the CPR (a reflection)

More and more public and private stakeholders are considering indoor air quality (IAQ) as a very relevant building performance characteristic. However, existing schemes at national and EU level are falling short of providing a comprehensive system covering design, construction and product information to guarantee reasonable levels of indoor air quality.

What should be achieved?

The concentrations of specific substances and particles as well as radiation should not exceed a level that is harmful for occupants. What sounds reasonably logical is more difficult the more one tries to achieve it: On one hand, sources of these pollutants can lay beyond the ability of designers, builders or occupants to control it – like pollutions from outdoor air. But even focussing on indoor sources only still leaves a wide range of possibilities: From temporarily used products like detergents for cleaning to moveable products like furniture to products which are difficult to remove – like construction products.

In addition, the risk scenario might differ significantly: While storage rooms are in general not permanently occupied, people are spending several hours per day in apartments and offices and are exposed pollutants much longer. The risk is even higher for populations groups with weaker resistance against pollutants like small children in kindergartens and schools or patients in hospitals.

The following observations are focussing on emissions from indoor air sources and their prevention or neutralisation. Outdoor sources are not or hardly to be influenced by architects, contractors, property owners or occupants and are therefore excluded in this paper.

How to achieve (higher) protection levels from a technical point of view?

There are three main approaches which – interacting with each other – can provide sufficient protection levels:

- Design of buildings/rooms
- Construction/installation/renovation
- Source control of products/materials used indoor

The intended use of buildings and rooms identifies the

- number of occupants,
- the average time they will remain in a room and
- potential risk scenarios (e.g. people with weaker immunity systems).

First steps to reduce the risk could be the increase of air volume and the reduction of the surfaces from which harmful emissions could be expected. Therefore, the dimensions of a room and the ratio

between the air volume and the surface of walls, ceilings and floors and their elements is essential in design.

As next step the air exchange rate could significantly influence the actual concentration of pollutants in indoor air. In most cases air exchange is not provided by mechanical ventilation or air conditioning systems. In addition, assumptions have to be made on occupant behaviour which could differ significantly between Member States and even regions.

Another approach is either restricting the use of specific materials or using restrictions for emissions of specific substances from products. For the substance restriction approach it should be clear what the overall concentration of specific substances in indoor air shall be and to identify the contribution of specific products to this concentration. This raises the question of which products are actually included in the calculation (e.g. construction products only – or including furniture? direct contact to indoor air only or including emission scenarios through other layers of materials?).

Where do we stand right now?

Which of the aspects mentioned above have been sufficiently covered?

Regulatory

- Safety levels for indoor air do not exist at EU level
- Safety levels for concentrations of specific substances in indoor air do exist at national level in:
 - Finland (2017/72//FIN)
 - Germany

Technical - Design

- Specific use or occupant scenarios (e.g. for high risk environments like hospitals) do not exist at EU or national/regional level.
- Specific guidance for design ???
- (HVA¹) Standards exist for indoor air exchange and specific air quality factors:
 - humidity,
 - ventilation,
 - control of air flows,
 - airtightness
- Reference room (TS 16516)

Technical – construction

- Installation requirements/guidance (at product data sheet level?)

¹ Heating, Ventilation and Air Conditioning

Technical – Product performance

- EU-LCI/AgBB are providing emission thresholds based on one basic scenario (https://ec.europa.eu/growth/sectors/construction/eu-lci_en/
<http://www.umweltbundesamt.de/en/topics/health/commissions-working-groups/committee-for-health-related-evaluation-of-building#textpart-1>)

- Product assessment standards for
 - EU-LCI
 - Formaldehyde
 - CMR

CEN/TS 16516:2013 Construction products – Assessment of release of dangerous substances – Determination of emissions into indoor air

- Harmonised European product standards covering emissions/content of dangerous substances (under preparation)

Way forward

Considering that several technical aspects are missing in the current national and European systems, the following steps should be taken to guarantee reasonable levels of indoor air quality:

- A framework document defining indoor air quality "targets" for different risk scenarios/risk groups and describing the connections between design, construction and product performance to achieve these "targets".
- A technical document describing principles to ensure/improve indoor air quality at design level
- A technical document describing principles to ensure/improve indoor air quality at construction level
- A technical document describing principles to ensure/improve indoor air quality via product performance

The documents should be available for free for stakeholders. The main target groups are

- Practitioners in design and construction
- Public authorities to define their requirements in national/regional building codes
- Teachers/trainers (e.g. Technical Universities)

It should be stressed that these documents should be evaluated that they are simple, transparent and praxis-oriented. They also need to be updated at regular intervals.

These documents could be developed by the JRC based on its groundwork on indoor air quality that resulted in the development of ECA report no 29².

² See: JRC ECA report no 29: Harmonisation framework for health based evaluation of indoor emissions from construction products in the European Union using the EU-LCI concept

http://publications.jrc.ec.europa.eu/repository/bitstream/JRC83683/eca%20report%2029_final.pdf

Note: Another possibility would be to mandate this work to CEN. TC 351 (Working Group 2) has been working on indoor air emissions and was the main actor developing a "reference room" as instrument to create the link between the two different approaches in the EU of either setting indoor air quality levels or product emission levels. However, this would still leave the problems of copyrights to make these documents available to all stakeholders for free.