Investigations for the improvement of the measurement of volatile organic compounds from floor coverings within the health-related evaluation of construction products

O. Wilke, W. Horn, K. Wiegner, O. Jann, W. Bremser, D. Brödner, S. Kalus, R. Juritsch, C. Till

Short summary

In the German Institute for Construction Technology's (DIBt) principles for the health assessment for construction products used in interiors, the evaluation procedure of the Committee for Health-related Evaluation of Building Products (AgBB Scheme) is contained as a substantial base. This scheme evaluates the emissions of volatile and semivolatile organic compounds (VOC and SVOC), determined by test chamber measurements. Within the interlaboratory comparison, which was divided into three steps, the emission test method from building products was checked against the principles of health-related evaluation of construction products in indoor spaces (based on DIN EN ISO 16000-9 together with DIN ISO 16000-6) with the co-operation of 29 European test institutes. The objective was to assess the comparability of the test method carried out in different test chambers and using different thermodesorption devices.

In the first step the analysis of liquid solutions took place to observe the influence of the analysis itself. In the second step VOCs were sampled in the air of a BAM test chamber onto tubes from the participants for the analysis by them. In the third step a complete emission test chamber measurement was carried out by the participants.

A major problem for the execution of such interlaboratory comparisons is the lack of reference materials. Therefore the homogeneity of the test material was of great importance.

As a result of the first step (analysis of 4 liquid solutions) a standard deviation of less than 20 % for 8 out of 11 substances tested was obtained. The standard deviations for dichloro-propanol, caprolactam and butyl diglycol ranged up to 36 %. The second step, which included air sampling at a BAM test chamber, resulted in only one standard deviation value less than 20 % (11 % for styrene). The standard deviations for the other six substances were between 20 % and 36 %. For step 3 a sealant was chosen instead of the flooring material for homogeneity reasons. In step 3 the standard deviations for 4 of the 7 measured VOC concentrations from two chamber tests were between 17 % and 19 % and thus within the same range as in Step 1 and even better than for most substances in Step 2. A standard deviation of 60 % was found for the key component ethanediol, but this can be explained with the difficult analysis method for this substance.

A second objective of the project was to formulate criteria against which the specialist competence of the test institutes for emission tests can be checked and based on the principles for the health assessment for construction products used in interior. For this purpose a catalogue of criteria has been developed, which is divided into three parts. In the first part, basic requirements are formulated such as impartiality, accreditation for test chamber measurements, verification of experience by participation in earlier interlaboratory comparisons and the laboratory equipment. The second part requires the test-specific proof in the form of successful participation in interlaboratory comparisons organised by BAM bi-annually. The third part instructs the laboratories that they must ensure they are always up-to-date both in terms of their knowledge and the available equipment. The quality assurance for the knowledge is ensured by regular participation in the exchanging of experience between the test laboratories. In terms of technical requirements the test institutes must be willing to successfully participate in at least one interlaboratory comparison per year.

The present interlaboratory comparison was not designed to recognise the participating test laboratories in the field of the construction product testing for a DIBt approval.