

VOC from building products

Results from seven proficiency tests with emission test chambers conducted between 2008 and 2021



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Proficiency tests for emission chamber testing organized by BAM

In Europe, the Construction Products Regulation (CPR, 2011/305/EU) sets basic requirements (BR) on how construction works must be designed and built. BR 3 "hygiene, health and the environment" states low emissions of toxic gases, Volatile Organic Compounds (VOCs), particles, etc. from building

materials. Meanwhile, a worldwide network of professional commercial and non-commercial laboratories performing emission tests for the evaluation of products for interior use has been established. Therefore, comparability of test results must be ensured. The participation in proficiency tests is a tool to prove a laboratory's proficiency. Since 2009

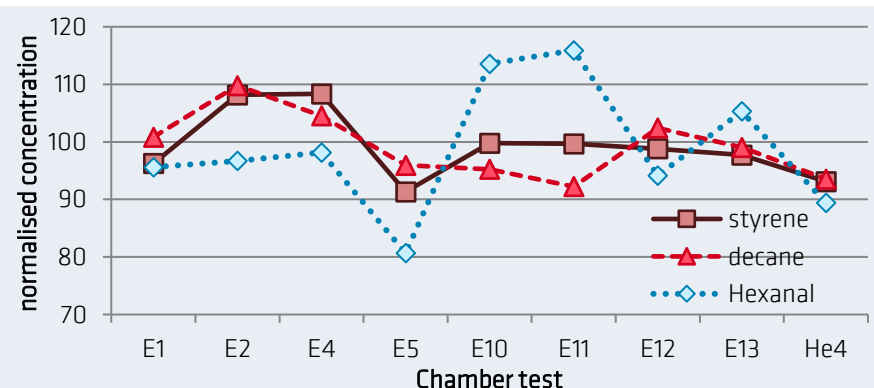
BAM offers such comparison exercises for emission chamber test nearly every two years using well-characterised test materials (one sealant, one furniture board and four times a lacquer) with defined VOC emissions. Participants must identify and quantify VOCs substance specific.



Material and homogeneity check

Generally, any commercially available product on the market could be used as VOC reference material, provided it is thoroughly characterized. However, these materials often emit only a few and material specific VOCs and appropriate homogeneity is not given. Therefore, alternative

materials should be developed. BAM used different materials over the years. Currently, the best suited reference material is a cured lacquer containing several VOCs added to the liquid lacquer system. The round robin tests 2014, 2016, 2018 and 2021 were conducted with such a system.



Overview - some results

The results show that the number of VOC measured with relative standard deviations (RSDs) below or equal 30 % has improved over the years to 83 %. In the 2021 RRT, two compounds with concentrations below 10 µg/m³ were used for the evaluation. At this low level RSDs above 30 % can be found very often, because this is quite close to the limit of quantification.

For more than 10 years, BAM is organizing RRTs for VOC-emissions in emission test chambers with participants worldwide. A value of

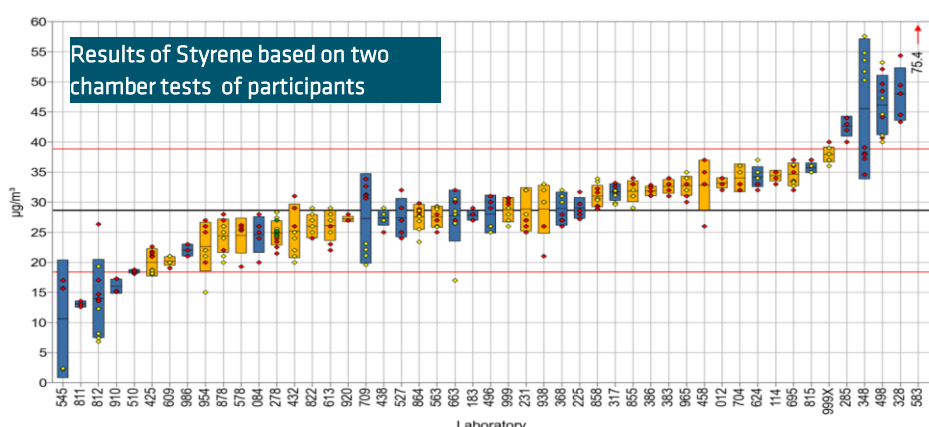
less than 30 % for the mean relative standard deviation is today's state-of-the-art for VOC measurements by means of emission test chambers. However, the results for some compounds show that it is possible to reach RSDs less than 20 % for individual VOCs. For this, it is necessary to have a continuous control of test chamber conditions and analytical performance. The BAM data reveal that the comparability of test chamber measurements could be improved within the last decade.

Results of the proficiency tests given with the parameter of RSDs. 30 % is the defined limit value for the evaluation of results. (AL: all labs; EL: expert Labs)

	2008	2009	2012	2014	2016	2018	2021
VOC RSD ≤30% AL	80	33	38	33	63	83	58
VOC RSD ≤30% EL		67	38	56	75	83	83
Mean RSD AL	22	36	34	39	29	28	31
Mean RSD EL		29	32	31	28	27	23
Number of VOCs	5	6	8	9	8	12	12
No: AL/EL	28/-	37/26	46/28	55/24	49/21	50/24	51/27

General remarks to VOC chamber PTs

- Identification and quantification in one round robin is very ambitious
- The quality of used reference material got better over the years
- Some VOCs show better RSDs than others.
- Commercial availability of emission reference materials is desirable for QA/QC of test chamber method



Sicherheit in Technik und Chemie