

Quality of Emission Testing

Emission testing of products is performed in order to demonstrate compliance with statutory requirements or with ecolabels. This is applicable for building products, furniture, car parts etc. The reproducibility of such tests between different laboratories has not been found to be well in agreement



Reliable emission test results are essential because these may influence market share (via allocation of HIGH or LOW emissions), development strategies, and other economic decisions. Typical test parameters include volatile organic compounds (VOC), total VOC (TVOC), and formaldehyde.

If low emissions are certified as a result of laboratory error, then control analyses by competitors or by consumer organisations which show that the product is emitting excessive volatile chemicals, may destroy public perception of the product. Conversely, if high emissions are certified as a result of laboratory error, then a company may lose market share even if the product is as good as or even better than competing products.

Each of these cases may have a significant impact on the economic performance of a manufacturer endeavouring to place low emission products on the market. For small manufacturers, future business success may depend on reliable certification of low emission.

Even though test procedures are precisely specified in testing protocols and

international standards, the reproducibility of test results between laboratories has been found to be not good enough.

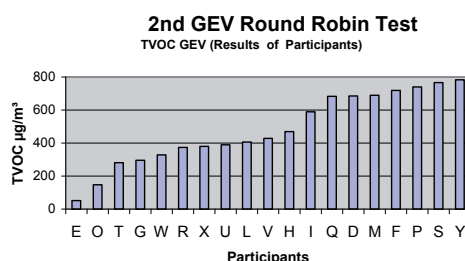
This was observed in several round robin tests where many laboratories received the same product and tested and reported VOC emissions following the same test procedure and reporting format.

See below for an example of such comparative testing and an analysis of the causes of non-uniformity of test results, as well as an approach to handling these problems.

Example: GEV Round Robin Test

20 laboratories from 7 countries participated voluntarily in a GEV round-robin test in 2003. The participants prepared a test specimen from a model adhesive and stored it in a test chamber under well-defined conditions. They then determined the TVOC and all individual VOC substances of concentration greater than $5 \mu\text{g}/\text{m}^3$ after 10 days.

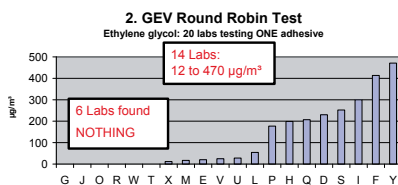
The results showed variations of TVOC and individual VOC substances of the same order of magnitude as had been found in previous round-robin tests. A later comparative test of German DIBt with two types of floor coverings gave a very similar result.



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In both cases the highest results were 10-15 times higher than the lowest results. The overall variation of TVOC was $\pm 40\%$ (relative standard deviation).

A more detailed investigation showed that the most significant problem was that different laboratories found different VOC substances - and therefore used different quantification factors. As an example, the results are shown for ethylene glycol.



The results were better for a few other substances. In general, the variation is not worse than that for many other types of tests. Anyhow, any buyer of an emission test has a problem in selecting a good testing laboratory.

It is easier to fulfil a certain limit value for emissions when using a test house that delivers low results most frequently. But the risk then is that a consumer organisation or a competitor will raise accusations of false claims after procuring another test that gave higher results.

Selecting a testing laboratory with reliable performance will provide protection against such attacks. When comparing different laboratories, the following criteria should be considered as well as price.

Quality parameters:

- ISO 17025 accreditation is granted, not on the whole laboratory, but on single test methods. This accreditation, if encompassing emission testing and VOC analyses, is essential but is no guarantee of good performance.
- Temperature and humidity need to be monitored continuously in all test chambers for identifying any deviations.
- Coverage: The back and edges of floorings need to be covered tightly. The preferred technique for this is a stainless steel frame with Teflon fittings.
- Recovery control: The test house should investigate whether all emitted volatiles will be measured, and not partly adsorbed at the chamber walls or not desorbed from the sampling tube.
- Blank control: The test house should ensure that the chamber is clean before the start of each test.
- Breakthrough control: A minimum of two adsorption tubes in series (or two phases in one tube) must be used for each air sampling exercise and analysed separately. High amounts in the second tube will indicate that some volatiles may have been lost. If not two tubes are used, the results may be unsafe.
- Duplicate determination of chamber air: The test house should always use two sets of double tubes in parallel and analyse them separately. This is important for identification of any potential problems with the adsorption tubes.
- Each VOC measurement therefore requires 4 adsorption tubes in total (although not yet usual in all test houses).
- From time to time the test house should perform complete duplicate testing by cutting two pieces from one sample and testing in two separate test chambers.
- At least daily control of the quantitative response of the GC/MS system is necessary.
- Traceability: Any standards used for quantification should be traceable to weight or to certified solutions.
- Most VOC chemicals of interest should be available as standards for identification and quantification.
- Good analysis requires that the personnel in the laboratory dedicate sufficient time for correct analysis - this requirement could be in conflict with low price offers.
- The test house should participate in round-robin tests at least once per year and show results upon request.

Eurofins quality policy

Eurofins always fulfils the above even if other test houses with lower requirements may need fewer efforts and then offer lower prices. Eurofins always aims at delivering results in which the customer can have confidence.

Eurofins always seeks quality accreditation and recognition by many national emissions classification systems. Currently Eurofins provides test results to most European labels for low emission products as well as to selected labels from countries outside Europe.

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