Industrieverband Klebstoffe e.V.

Determination of volatile components in dispersion adhesives

Issued by the German Adhesives Association – Technical Committee Wood Adhesives July 2022

Adhesives are indispensable for the products of a modern society. Despite their many advantages, adhesives are often the subject of critical public debate – mainly because of their assumed content of volatile organic components, the so-called VOCs. Compared with other adhesives, however, dispersion adhesives have a very low content of VOCs. During processing, they hardly contribute to the pollution of indoor air. VOCs can be released from dispersion adhesives by substances used in the manufacturing process such as solvents, plasticizers, film-forming agents, antioxidants, stabilizers and catalysts as well as fragrances, flame retardants and biocides.

The AgBB scheme, developed by the German Committee for the Health-Related Evaluation of Building Products, is currently the best-known evaluation scheme for VOC emissions. Meanwhile, testing according to the AgBB scheme is mandatory for some building products.

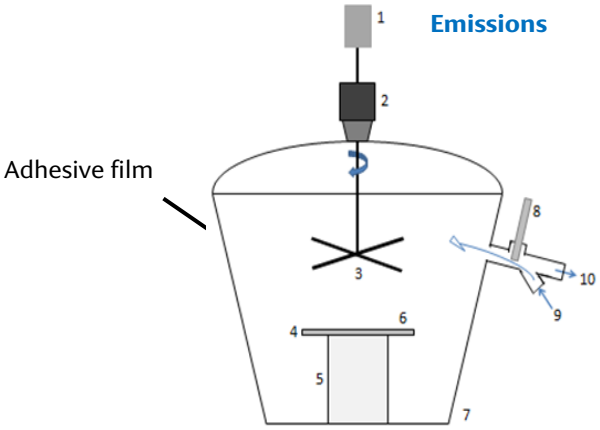
The abbreviation VOC generally covers all volatile organic compounds that, under normal conditions, are found in the air in gaseous and vaporous form. These include, for example, alcohols and acids as well as aldehydes. Many solvents, liquid fuels and synthetically produced substances can occur in the form of VOCs, as can numerous organic compounds which are formed in the course of biological processes. Many hundreds of individual compounds can be present in the air at any time. In addition to VOCs, the World Health Organization (WHO) also distinguishes between very volatile organic compounds (VVOCs) and semi-volatile organic compounds (SVOCs). The sum of all VOC concentrations is called the TVOC value (total volatile organic compounds).

Although many adhesives are not building products, they are frequently tested according to AgBB criteria. The currently established practice for determining VOC emissions in building products is described in the standards EN 16516 and ISO 16000. Here, a standardized test chamber is used from which air samples are taken and analyzed after a predefined measuring time of 28 days to determine the product emissions. However, the comparability of the results obtained is problematic in many tests, since different application quantities, loading factors and air exchange rates are used depending on the label and the standard.

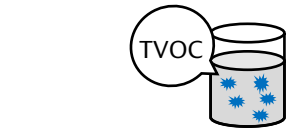
Another stumbling block in the evaluation of emissions using the **test chamber method** is the fact that the adhesive is not tested separately but often together with the structural component. Strictly speaking, this is a component test in which, according to the "polluter pays principle", all individual components would have to be taken into account as emitters for the interpretation of the results. The total values resulting from the chamber measurements are therefore not suitable as a criterion for evaluating the emission behavior of an adhesive. They are, however, indicative of the overall situation. If a dispersion is to be evaluated, or if dispersions are to be compared with each other, the dispersion must be tested on its own. For this purpose, the Technical Committee Wood Adhesives

recommends the so-called **in-can method**. It focuses exclusively on the emission potential of the adhesive. It can be assumed that an adhesive with a low VOC content will also make a low contribution to total emissions when determining the sum values of the structural component manufactured with this adhesive. Processors thus have an objective indicator when selecting a suitable adhesive for their application.

Test chamber method (DIN EN 16516)

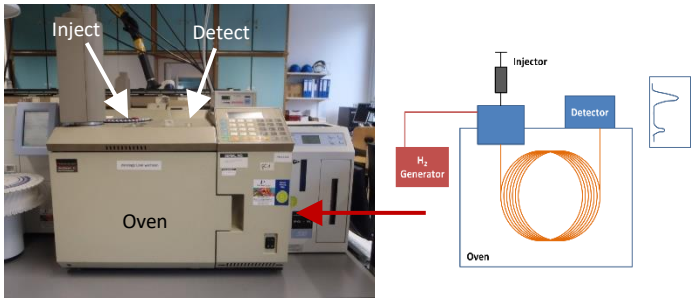


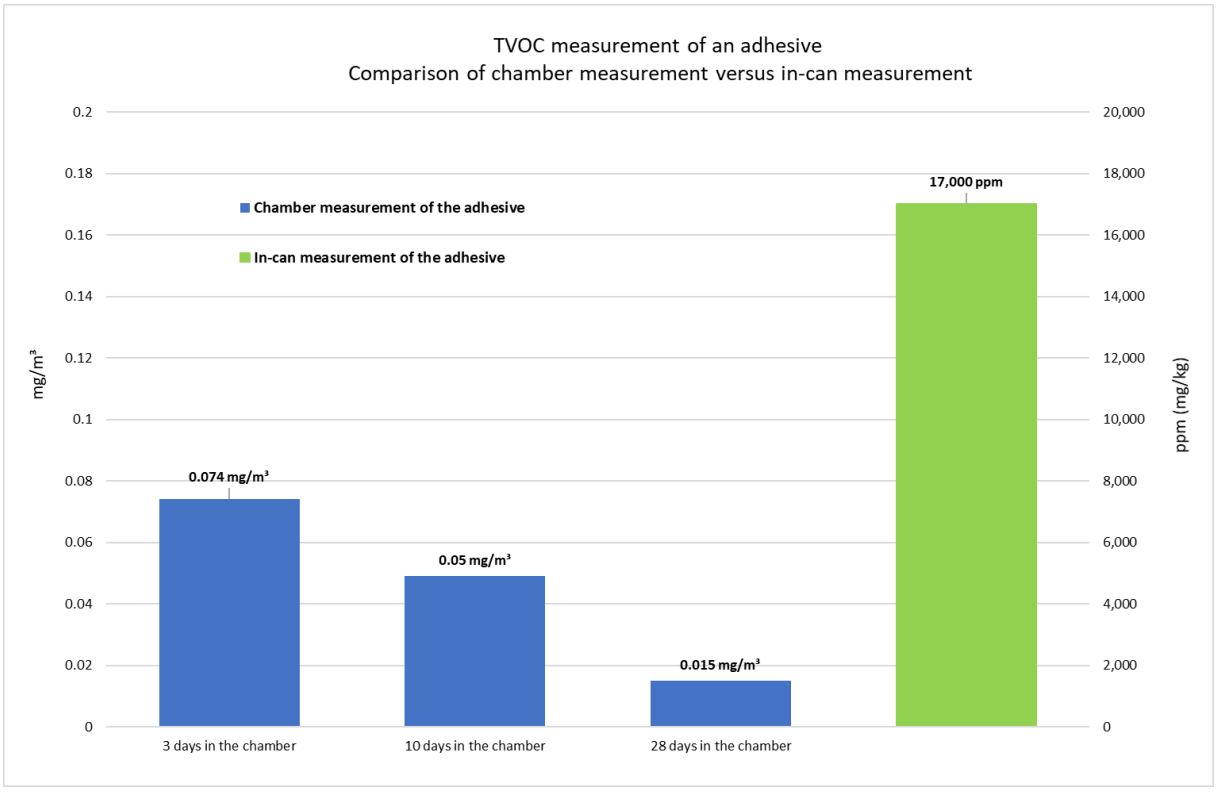
In-can method (ISO 11890-2)



VOC measurement in the original adhesive

After proper preparation of the adhesive, its VOC content is measured.





In this graph, values measured with the in-can method are indicated in ppm (mg/kg), whereas values measured in the test chamber are indicated in mg/m³. This is not the only reason why the values clearly differ from each other – they also cannot be converted into each other. In this example, the film-forming agent accounts for the largest portion of the TVOC: it amounts to approx. 2% in the adhesive.