

# GEV and EMICODE® – **Questions and Answers**



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## 01. What are emissions?

An emission refers to the release of substances in a gaseous, liquid or solid state from equipment or materials into the surrounding atmosphere. Vibrations, noise or rays can also be emitted. The main factors influencing indoor air quality are the type and quantity of emissions in the form of gaseous organic compounds (VOC, see 2.).

## 02. What are VOCs, SVOCs and what are LCI values?

VOC is an English abbreviation for Volatile Organic Compound(s); these are volatile organic substances that change from a liquid to a gaseous state at room temperature and normal pressure. Typical VOCs include all organic solvents, as well as fuels such as gasoline, diesel oil, etc. Unfortunately, there is no single general binding definition for VOC but rather several, with some of these differing significantly from one another.

In the European guideline 2010/75/EU ("IED Guideline"), VOCs are described as organic compounds with a vapor pressure of 0.01 kPa or above (at room temperature  $T = 20\text{ °C} = 293.15\text{ K}$ ). This definition is almost identical to the term "solvent" in Point 3. Another definition is given by the European guideline 2004/42/EG ("Decopaint Guideline"). This guideline considers VOCs as all volatile compounds with a boiling point or initial boiling point of  $250\text{ °C}$  or below (at normal pressure  $p = 1013\text{ kPa}$ ).

VOCs with a boiling point above  $250\text{ °C}$  are defined as SVOCs (Semi Volatile Organic Compounds). A TVOC value (Total Volatile Organic Compounds) is the sum of the VOC values of all (measured) compounds, with a TSVOC being the sum of all SVOCs measured. As well as evaluating total emissions, a so-called "Lowest Concentration of Interest" (LCI value) has been determined for many substances in order to evaluate individual substances. To attain EMICODE® Class EC 1<sup>PLUS</sup>, a single substance is evaluated on the basis of LCI values.

## 03. What are solvents, softeners, etc.?

Solvents or thinners are liquid compounds in which other substances dissolve. Basically, these may be inorganic (e.g. water) or organic. In this context, however, generally only organic solvents are meant, as defined, for example, in the relevant guideline for Germany, TRGS 610, i.e. organic compounds with a boiling point of  $200\text{ °C}$  or lower. For products used to treat the surface of parquet flooring, TRGS 617 defines the term solvent as a compound with a boiling point of  $250\text{ °C}$  or below. These are utilized to dissolve other substances and are intended to evaporate fairly quickly after use on the product, e.g. paint or adhesive. Softeners are marginally volatile and are therefore classified as SVOCs rather than VOCs.

## 04. How do VOCs get indoors?

VOCs can have different sources. For example, a product may contain solvents that evaporate intentionally or unintentionally. However, other materials, fittings or devices containing organic compounds may also emit VOCs into the ambient air. Examples of such materials are: chipboard, building materials, textiles, plastics, wood, wool, perfumes, scented candles, air fresheners, copiers, care products, nail varnish removers, cosmetics, etc. These VOCs can be the result of production processes (e.g. solvent residues in a furniture coating), degradation reactions of organic compounds due to the presence of oxygen in the air, or also light and/or decay or mold (microbial VOCs, so-called MVOCs). Humans, animals and plants also emit significant quantities of VOCs. The ambient air in a room may therefore contain VOCs from numerous different sources. In newly-refurbished rooms, in particular recently-applied paints, adhesives, sealants, etc., as well as new pieces of furniture and home textiles, temporarily increase the TVOC concentration.

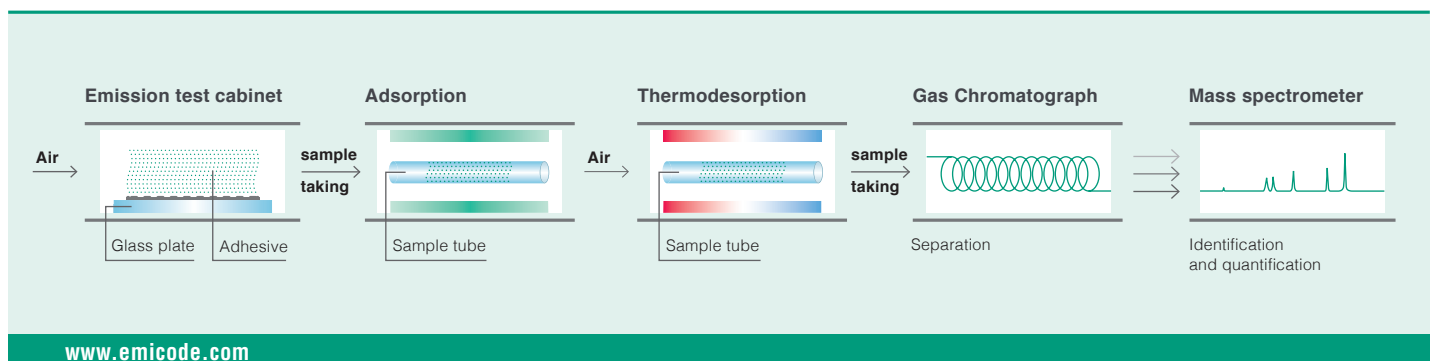
## 05. How are VOC emissions measured?

Using today's state-of-the-art highly-sensitive laboratory analysis techniques, such as gas chromatography (GC) and mass spectrometry (MS), the tiniest traces of VOCs in the air can be detected and quantified. The emission characteristics of materials can be ascertained in specially-designed test chambers; samples of air are taken from the chamber after specific periods of time and then analyzed. VOC concentrations are expressed in  $\text{mg}/\text{m}^3$  or  $\mu\text{g}/\text{m}^3$ , i.e. thousandths or millionths of a gram per cubic meter of air. The sum of the individual VOC concentrations gives the TVOC value (total concentration of VOC).

## 06. How dangerous are VOCs?

There are limiting values, use restrictions and labeling regulations for substances that are known to be harmful to health, toxic, carcinogenic or hazardous in other ways. However, there is very little sound scientific knowledge about the effects of many other VOCs, especially where very low concentrations are concerned. Since many VOCs, either on their own or in combination, are suspected of having a negative effect on a person's well-being or health, today scientists all over the world are working on finding ways to avoid VOC emissions. In some EU countries, in particular Belgium, Germany and France, there are national regulations on the VOC and SVOC content of certain products.

### VOC – Testing method:



## 07. Where does the frequently-cited VOC target value of 300 µg/m³ come from?

In the so-called Seifert study, which was conducted in 1985/86, the Federal Ministry of Health at the time requested the measurement of the normal concentration of VOCs in the ambient air of approx. 500 German households. More than 50 different substances were identified. Concentrations fluctuated greatly from one household to the next, with levels ranging between 170 and 2600 µg/m³. The statistical analysis of the study resulted in a mean value (50th percentile value or meridian) of approx. 330 µg/m³, which was then rounded down to 300 µg/m³ and viewed by many specialists to be the desired target value. In 1990 at the Indoor Air Conference in Ottawa, Seifert himself ascertained that the value of 300 µg/m³ TVOC, as well as the values for individual VOC groups, were only long-term desired target values without a toxicological evaluation. In the case of newly-renovated rooms, for example, he described levels 50 times higher than this value after 1 week and 10 times higher after 6 weeks as perfectly acceptable.



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Due to enormous advances in analytics, today it can be assumed that a much higher number of substances and also higher normal values will be ascertained. Furthermore, the composition of products has also changed significantly. It is important to understand that Seifert's target value of 300 µg/m³ for indoor areas, which are affected by numerous complex factors, has nothing whatsoever to do with the values obtained from individual products or materials in a test chamber. Values determined in a test chamber enable products to be evaluated in a relative way (ranked) but give no information about anticipated concentrations in the ambient air.

## 08. Do natural compounds also emit VOCs?

Natural or biological products often emit higher VOC emissions than synthetic products. Natural adhesives contain natural tree resins, turpentine oils, etc., which emit substantial quantities of so-called terpenes. These can cause typical smells and high TVOC values in the ambient air.

## 09. Who is GEV?

Renowned manufacturers of flooring adhesives have decided to develop flooring installation products with minimal emissions and to promote their use on the market. To create a binding basis, the "Gemeinschaft emissionskontrollierte Verlegewerkstoffe e.V." (GEV) (Association for the Control of Emissions in Products for Flooring Installation) was founded in February 1997. To meet market demands to test further types of product, GEV was renamed in 2007 as "Gemeinschaft emissionskontrollierte Verlegewerkstoffe, Klebstoffe und Bauprodukte e.V." (Association for the Control of Emissions in Products for Flooring Installation, Adhesives and Construction Products). Any manufacturer of such products can become a GEV member. Sponsoring memberships are also possible and very welcome.

## 10. What are GEV's tasks and objectives?

The main task of GEV is to promote consumer, occupational and environmental protection with regard to the use of chemical products and adhesives in construction. GEV has an open information policy and encourages cooperation among all manufacturers with partners from all different branches of industry. The first and foremost step GEV took in this regard was to elaborate a method to enable the market to independently evaluate and differentiate between the numerous flooring installation products, adhesives and construction products from the aspect of VOC emissions. To achieve this, the product classification system EMICODE® was developed.

## 11. How many members does GEV have?

In January 2016, GEV had 106 ordinary and 5 sponsoring members from 17 countries. The current list of members can be found in the Internet under [www.emicode.com](http://www.emicode.com). Of course, you can also request the list by phone or fax. You will find the phone number on the back of this brochure.

## 12. Who can become a GEV member?

Any manufacturer of flooring installation products, adhesives and construction products or raw materials in the world who agrees to observe GEV regulations and support the goals of GEV.





### 13. What does EMICODE® mean?

EMICODE® is the name of a classification system protected by trademark, which is used to classify flooring installation products, adhesives and construction products into the three following classes according to their emission characteristics:

- EMICODE® EC 1<sup>PLUS</sup> \*
- EMICODE® EC 1 \*
- EMICODE® EC 2 \*

\* or EMICODE® EC 1<sup>PLUS</sup> R to EC 2 R = corresponds with “regulated”

The EMICODE® classification system is based on analytically-determined measurement data and concrete classification criteria obtained using a defined testing method. Since the term “low-emission” has neither been standardized nor clearly defined, EMICODE® provides a binding basis to assess and select flooring installation products, adhesives and construction products.

### 14. What does the “R” mean in the EMICODE®?

The “R” (= regulated) was introduced for products that have very low emission levels but still require work protection measures when used. In such cases, specific hazardous properties demand specific protective measures when handling these products. Despite this, the emission characteristics of these products still warrant the EMICODE® classification. For example, products containing cement bear the “R” because protective gloves and glasses need to be worn in order to protect the skin and eyes when handling them.



The same applies for all products containing reactive resins, as well as other products which require labelling and are subject to regulations in order to ensure their safe handling. In this sense, the “R” stands for “regulated”. The EMICODE® label on such products displays a grey R in the background.

### 15. Which products have an EMICODE® classification?




GEV currently defines testing methods and classification criteria for the most important product groups used to install flooring, parquet and tiles, in order to establish a meaningful basis for low-emission interior installations in the classification system. The product groups are adhesives and adhesive tiling mortars, primers, fillers, parquet coatings, grouts, waterproofing grouts, surface sealants and joint sealing compounds, joint sealing tapes, sealing foils, vapour barriers, joint insulation materials, water-based joint fillers, as well as binders and mortars for concrete flooring.

Basically, all other products can also be classified according to EMICODE®, provided there are current GEV testing methods and GEV classification criteria for them. GEV is also working on definitions for further product groups used in interior installations, as well as on the development of inspection and classification criteria for them.

## 16. How high are the limiting values of the EMICODE® classes?

The EMICODE® classification classes for TVOCs (total volatile organic compound(s)) or TSVOCs (total semi volatile organic compound(s)), as well as for the evaluation of individual compounds, have been defined for the various product groups as follows:

#### ■ Installation products and other construction products (general requirements):

			
$\mu\text{g}/\text{m}^3$			
TVOC after 3 days	$\leq 750$	$\leq 1000$	$\leq 3000$
TVOC after 28 days	$\leq 60$	$\leq 100$	$\leq 300$
TSVOC after 28 days	$\leq 40$	$\leq 50$	$\leq 100$
R-value based on AgBB LCI values after 28 days	1	-	-
Total of non-evaluable VOC	$\leq 40$	-	-
Formaldehyde after 3 days	$\leq 50$	$\leq 50$	$\leq 50$
Acetaldehyde after 3 days	$\leq 50$	$\leq 50$	$\leq 50$
Total of formaldehyde + acetaldehyde	$\leq 0,05 \text{ ppm}$	$\leq 0,05 \text{ ppm}$	$\leq 0,05 \text{ ppm}$
Total of volatile C 1A/C 1B substances after 3 days	$\leq 10$	$\leq 10$	$\leq 10$
Each volatile C 1A/C 1B substance after 28 days	$\leq 1$	$\leq 1$	$\leq 1$

#### ■ Surface treatment products (parquet coatings, water based gap fillers):

$\mu\text{g}/\text{m}^3$			
Total of TVOC + TSVOC + TVVOC after 28 days	$\leq 100$ of which max. 40 SVOC	$\leq 150$ of which max. 50 SVOC	$\leq 400$ of which max. 100 SVOC
Formaldehyde after 3 days	$\leq 50$	$\leq 50$	$\leq 50$
Acetaldehyde after 3 days	$\leq 50$	$\leq 50$	$\leq 50$
Total of formaldehyde + acetaldehyde	$\leq 0,05 \text{ ppm}$	$\leq 0,05 \text{ ppm}$	$\leq 0,05 \text{ ppm}$
Each volatile C 1A/C 1B substance after 3 days	$\leq 10$	$\leq 10$	$\leq 10$
Each volatile C 1A/C 1B substance after 28 days	$\leq 1$	$\leq 1$	$\leq 1$

### 17. What is EC 1<sup>PLUS</sup>?

The EMICODE® and its best class, EC1 (R) have become established over the last ten years as a standard for products with very low emissions. In 2010, EC 1<sup>PLUS</sup> was introduced as the premium class, which defines the limits of technical feasibility and clearly sets even stricter limits.



## 18. What do the GEV classification criteria look like and who fixes them?

In order for a product to be labelled with an EMICODE®, it has to fulfill a series of important basic requirements. Adhesives, for example, must be free of solvents with a boiling point < 200 °C, although a trace of max. 0.5 % is tolerated because this is often technically unavoidable.

The emission of certain C-substances (see 19.) may not exceed a defined limit after 72 hours in the test chamber and there must be a corresponding EU safety data sheet for it. Classification into one of the three EMICODE® classes depends on the total emissions (TVOC-value) determined in the test chamber using the appropriate GEV testing method.

GEV testing methods and GEV classification criteria are set by the GEV Technical Council. The Technical Council is elected by the members of GEV every two years and assisted by external experts. The Technical Council is also responsible for continuously updating the methods and classification criteria in keeping with the state of the art, as well as for advancing the development of the EMICODE® system.

## 19. What are C-substances?

Broadly speaking, C-substances are carcinogenic substances; however, these are divided into three different categories.

- **C 1A:** substances, which are known to have a carcinogenic effect on humans.
- **C 1B:** substances, which so far have only proved to be carcinogenic in tests on animals.
- **C 2:** substances with a justified suspicion of having a carcinogenic effect. Current knowledge is however insufficient in order to assume a carcinogenic effect.

In the course of the emission measurements in the test chamber, a test conducted after 3 days and after 28 days identifies the presence and concentration of any relevant C-substances emitted. The limiting values defined in Point 16 were determined as a basic requirement for an EMICODE® classification.

## 20. What does the GEV test method consist of?

The test consists of a procedure using a test chamber, which has been developed and defined in cooperation with renowned testing institutes. Depending on the type of product concerned, a characteristic sample of the product is prepared (in the case of an adhesive, for example, a layer is applied to the surface of a defined substrate). This is then placed in a test chamber with specific ventilation and climatic conditions prevailing to approximate the conditions in which the product is used. The chamber must have a minimum volume of 100 liters. The size of the product sample is calculated to achieve emission levels of 0.007 - 0.4 m<sup>3</sup>/m<sup>3</sup>.

## 21. Who is allowed to perform the GEV test procedure?

Product tests may only be conducted by a test laboratory or institute that has been accredited according to ISO 17025. It must also have the necessary apparatus and be able to prove that it follows the GEV test procedures strictly. On request, GEV can name suitable testing institutes.



Eurofins Product Testing A/S

## 22. Why are there differences in the sampling of products?

Products with a low viscosity, such as parquet varnishes, cannot be applied with a notched trowel. As a result, samples of these products need to be made in a different way using lower quantities than with other products, such as paste-like compounds, e.g. mortar or joint sealants. Cement mortars, on the other hand, display totally different emission characteristics to parquet varnishes, joint sealants or adhesives. Subject to these differences, different sampling need to be fixed for different product groups.

## 23. Who makes the EMICODE® classification?

GEV members are individually responsible for classifying products into the appropriate EMICODE® class. This is based on the test results of the TVOC and C-substance measurements conducted by a suitable testing laboratory. Through their membership, members are obliged to observe GEV regulations and GEV classification criteria. Therefore, the use of the EMICODE® system enables products to be reliably identified and compared.

## 24. How does a member obtain the EMICODE® license?

The manufacturer first verifies that the basic requirements for classifying a product into the corresponding EMICODE® class have been fulfilled and then makes a formal application for a license to GEV. This contains a reference to the underlying test report from an external testing institute and states the trade name of the product, as well as an identification number which traces back to the product formulation. The license issued is valid for five years.

## 25. What conditions apply for labelling a product with the EMICODE®?

Products may only be labelled with an EMICODE® if their manufacturer is a GEV member, who therefore recognizes the rights and obligations to GEV regulations as binding. It must be possible to group each product requiring a label into the GEV product matrix and all GEV basic requirements must be met (see Question 18).



The product is first tested and classified in accordance with the GEV test method and GEV classification criteria applicable to the respective product group. Upon presentation of a valid GEV license, the product can then be labelled with an EMICODE®.

## 26. May trademarks or brand names bear the EMICODE®?

Trademarks or brand names can be labelled with an EMICODE®, provided the manufacturer of the product is a GEV member and a valid GEV license has been obtained for each trademark or brand name of this product. If the distributor of the brand name changes manufacturers, the previous manufacturer is required to inform the GEV and request cancellation of the license. Should the brand name continue to bear the EMICODE®, the new manufacturer must also be a GEV member and be in possession of an appropriate license.

## 27. How is it verified that EMICODE® criteria are upheld?

Each year, GEV spends considerable amounts of membership contributions (2013: approx. 70,000 €) on making random checks on licensed products. In the event of an infringement, the manufacturer concerned is required to bear not only the costs of the inspection but also the costs of any further inspections necessary. In case of doubt, this shall be decided by arbitration. In the event of a second infringement, the member may be expelled from GEV. Should a violation of GEV criteria be ascertained and reported by a third party, the respective GEV member shall also cover his inspection costs if the infringement is confirmed.

## 28. Can complaints about odours be avoided through using products with very low emission levels which are labelled EMICODE®?

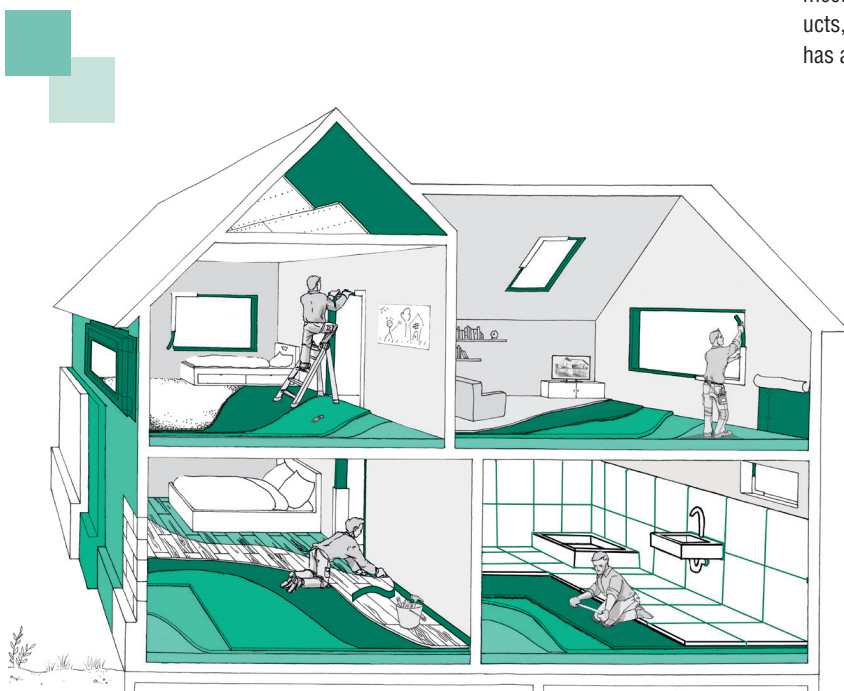
Products labelled EMICODE® only give off a slight odour during use and are practically odourless once they have hardened. Therefore, it is not to be expected that the EMICODE® products themselves will develop odours – on the condition that they are used correctly and as intended. This also includes cleaning and preparing the respective surfaces appropriately before applying the installation compounds. However, as already known, the development of odours after refurbishment and renovation work can have numerous causes. These include, in particular, so-called secondary emissions. These odour-producing substances can be formed as a result of alkaline humidity, insufficient drying, or other reasons. It would therefore be incorrect to assume that no such complaints will ever be made in conjunction with EMICODE® products. However, in the event of a claim, the person who recommended or used an EMICODE® product does not need to be unduly concerned about any ambient air tests that may be conducted.

## 29. Do any “emission-free” installation compounds exist?

With the exception of purely inorganic, mineral or metallic materials, hardly any products exist that do not give off at least traces of VOCs in one form or another. Consequently, organic materials, such as synthetic or natural substances, can never be emission-free. Furthermore, the advances being made in analysis techniques are enabling an ever-increasing number of VOCs to be detected in lower and lower concentrations. This is why “emission-free” building chemicals do not exist, nor will they ever in the future. GEV therefore considers the use of the term “emission-free” as incorrect and misleading.

## 30. Do any other labels exist that give information on emissions?

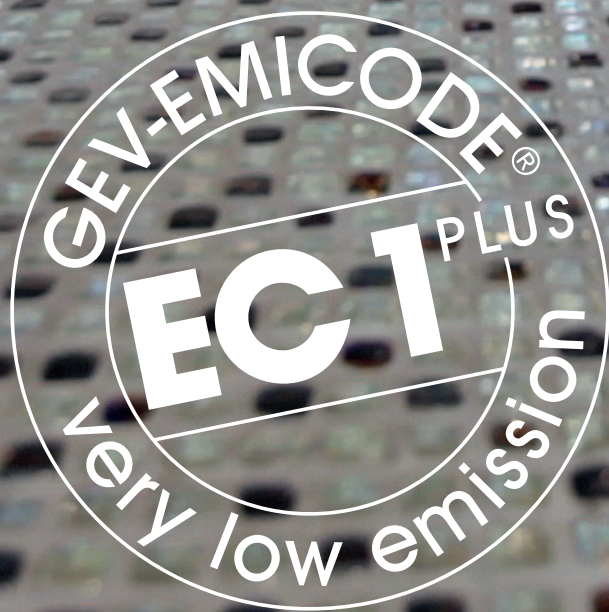
Besides the EMICODE®, there are national and international as well as other labels, such as the “Blue Angel” or “Greenguard” in the USA, which give information about emissions from installation products. Test series conducted by GEV have shown that EC 1 products also meet the requirements of these classification systems. EC 1<sup>PLUS</sup> products, on the other hand, are setting a new standard; no other system has any comparable class at the present time.







For the sake of  
your health.



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