

**BLUE ANGEL**

**The German Ecolabel**



**Low-emission Flooring Adhesives and other  
Installation Materials**

**DE-UZ 113**

**Basic Award Criteria**

**Edition of January 2019**

**Version 5**

## The Environmental Label is supported by the following four institutions:



Federal Ministry  
for the Environment, Nature Conservation  
and Nuclear Safety

The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety is the owner of the label. It regularly provides information on the decisions taken by the Environmental Label Jury.



The German Environmental Agency with its specialist department for "Ecodesign, Eco-Labeling and Environmentally friendly Procurement" acts as office of the Environmental Label Jury and develops the technical criteria of the Basic Criteria for Award of the Blue Angel.



The Environmental Label Jury is the independent, decision-making body for the Blue Angel and includes representatives from environmental and consumer associations, trade unions, industry, the trade, crafts, local authorities, academia, the media, churches, young people and the German federal states.



The RAL gGmbH is the awarding body for the Environmental Label. It organises the process for developing the relevant award criteria in independent expert hearings – which involve all relevant interest groups.

If you require further information please contact:

RAL gGmbH

**RAL UMWELT**

Fränkische Straße 7

53229 Bonn

Tel: +49 (0) 228 / 6 88 95 - 0

E-Mail: [umweltzeichen@ral.de](mailto:umweltzeichen@ral.de)

[www.blauer-engel.de](http://www.blauer-engel.de)

Version 1 (01/2019): First Edition, Expiry date: December 31, 2023  
Version 2 (06/2019): Editorial change, deletion of Acute Tox. 3 in para. 3.1 and Appendix B;  
Insertion of a footnote in compliance verification of para. 3.2  
Version 3 (11/2020): Changes in Appendix C List of approved in-can preservatives  
Version 4 (11/2021): Editorial change in Annex D  
Version 5 (05/2022): Editorial change in Annex C (footnote 28)

## Table of Contents

1	Introduction.....	5
1.1	Preface .....	5
1.2	Background .....	5
1.3	Objectives of the Environmental Label .....	6
1.4	Definitions.....	6
2	Scope .....	7
3	Requirements .....	7
3.1	General Substance Requirements .....	7
3.2	Indoor Air Quality.....	9
3.3	Odour Test (optional).....	11
3.4	Special Substance Requirements .....	11
3.4.1	Alkylphenol Ethoxylate.....	11
3.4.2	Plasticizers .....	11
3.4.3	Perfluorinated and Polyfluorinated Chemicals .....	11
3.4.4	Oxidizable Fatty Acids and Fatty Acid Esters .....	12
3.4.5	Organotin Compounds .....	12
3.5	Additional Substance Requirements .....	12
3.5.1	Preservatives .....	12
3.6	Special Requirements .....	12
3.6.1	Fitness for Use .....	12
3.6.2	Advertising Messages.....	13
3.6.3	General Information/Instructions .....	13
4	Applicants and Parties Involved.....	14
5	Use of the Environmental Label .....	15
Appendix A	Reference List (Legislation, Standards, Literature).....	16
Appendix B	Excluded hazard classes and hazard categories.....	17
Appendix C	List of approved in-can preservatives- NEW - valid from 01.12.2020 .....	18
Appendix D	Test Method for VOC Emissions.....	21

**This document is a translation of a German original. In case of dispute, the original document should be taken as authoritative.**

# **1 Introduction**

## **1.1 Preface**

The Environmental Label Jury has set up these Basic Criteria for Award of the Blue Angel Eco-Label in co-operation with the Federal Minister for the Environment, Nature Conservation and Nuclear Safety, the German Umweltbundesamt (Federal Environment Agency) and considering the results of expert hearings conducted by RAL gGmbH. RAL gGmbH has been tasked with awarding the Environmental Label.

Upon application to RAL gGmbH and on the basis of a Contract on the Use of the Environmental Label to be concluded with RAL gGmbH, the permission to use the Environmental Label may be granted to all products, provided that they comply with the requirements as specified hereinafter.

The product shall comply with all the legal requirements in the country where it is to be marketed. The applicant shall declare that the product meets this requirement.

## **1.2 Background**

Installation materials are used to prepare bases for floorings and to bond large-surface floorings in indoor environments. Hence, the lowest possible emissions from such products would be desirable for the user from an environment and health perspective.

The Blue Angel eco-label lends itself for the labelling of products that are low-emission and thus non-hazardous to health. The concept of these Basic Award Criteria is based on the evaluation scheme (AgBB-Scheme) developed by the "Ausschuss zur gesundheitlichen Bewertung von Bauprodukten" (AgBB) (Committee for Health-related Evaluation of Building Products) - a joint state and federal government committee composed of experts from environmental and health authorities".

The replacement of solvent-based adhesives by aqueous systems achieved by the German adhesive industry in the late nineties and in the early 2000s has led to a significant reduction of the indoor-air solvent load.

Modern installation materials are usually low-emission products but often differ with regard to smelling components, as for example, degradation products of oxidizable fatty acids and alkylphenol ethoxylates (APEOs). That is why an odour test has been newly included in these Basic Criteria. Such a test is still optional but all manufacturers are advised to perform it. The next revision of these Basic Criteria is expected to make to the odour test a mandatory requirement.

With today's normal indoor air-exchange rates the consumer wishes to be able to identify and buy adhesives involving the lowest-possible environmental load. The Blue Angel eco-label for low-emission flooring adhesives and other installation materials is designed to help the consumer make informed choices in this regard.

Installation materials may have significant environmental impact during the entire life cycle of the product. That is why the requirements for award of the Blue Angel eco-label refer to both the substances and materials used during the manufacturing process as well as to the period of use and the disposal.

In addition, the pollutant load of installation materials must be low in order to achieve - from an environment and health perspective - the lowest possible emissions from these products.

In order to evaluate the emissions from installation materials the concept of these Basic Award Criteria is based on the evaluation scheme "Indoor air quality requirements for buildings: Health

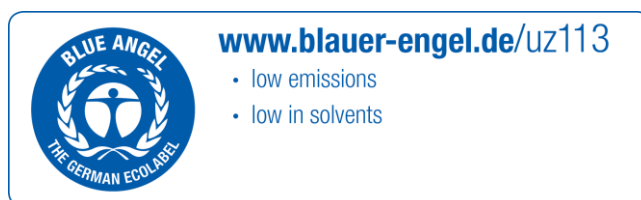
assessment of emissions of volatile organic compounds (VVOC, VOC and SVOC) from building products" developed by the "Ausschuss zur gesundheitlichen Bewertung von Bauprodukten" (AgBB) (Committee for Health-related Evaluation of Building Products) - a joint state and federal government committee composed of experts from environmental and health authorities.

### 1.3 Objectives of the Environmental Label

The Blue Angel eco-label for low-emission installation materials for interiors may be awarded to products which beyond meeting all relevant legal requirements –

- are manufactured in an environmentally friendly manner,
- are low in emissions and low in solvents,
- do not contain any hazardous substances that would significantly hamper recycling.

Therefore, the explanatory box includes the following benefits to environment and health:



### 1.4 Definitions

**Constituents:** substances added to the product as such or as a component of mixtures in order to achieve or influence certain product properties as well as those required as chemical decomposition products to achieve the product properties. This does not include, for example, minimised residual monomers.

**Product-type (PT) 6 - Preservatives for products during storage:** Products used for the preservation of manufactured products, other than foodstuffs, feeding stuffs, cosmetics or medicinal products or medical devices by the control of microbial deterioration to ensure their shelf life.

**SVOC:** semi volatile organic compounds; retention area  $>C_{16}-C_{22}$

**TVOC<sub>spez</sub>:** sum of all substances  $\geq 5 \mu\text{g}/\text{m}^3$  in the retention area  $C_6 - C_{16}$   
(total volatile organic compounds)

**TSVOC:** sum of all substances  $\geq 5 \mu\text{g}/\text{m}^3$  in the retention area  $> C_{16} - C_{22}$

**VOC:** volatile organic compounds; retention area  $C_6-C_{16}$

**VVOC:** very volatile organic compounds; retention area  $<C_6$

**WGK:** water hazard class

## 2 Scope

These Basic Award Criteria apply to

- solvent-free adhesives pursuant to TRGS 610<sup>1</sup>, as for example
  - ♦ dispersion adhesives pursuant to DIN EN 923<sup>2</sup>
  - ♦ powdered adhesives
  - ♦ fixing materials
- solvent-free base coats and primers pursuant to TRGS 610,
- cement-based surfacers<sup>3</sup> in accordance with DIN 13813 and calcium sulfate-based surfacers for use as installation materials in indoor environments,
- flooring adhesives based on silane-modified polymers (SMP-adhesives),
- adhesive tapes/films for full-surface bonding of floorings<sup>4</sup>,
- tile adhesives - dispersion-based adhesives D according to EN 12004<sup>5</sup>
- mineral grouts according to DIN EN 13888<sup>6</sup>.

Excluded are:

- wallpaper pastes
- reactive adhesives R in accordance with DIN EN 12004<sup>5</sup>.

The flooring adhesives and other installation materials listed under "Scope" will be referred to hereinafter as "installation materials".

## 3 Requirements

### 3.1 General Substance Requirements

Compliance with the German and European chemicals legislation as well as with the industry-related regulations is considered a matter of course for Blue Angel eco-labelled products (this includes above all REACH Regulation, Annex XVII, Persistent Organic Pollutant Regulation (POP) Annex I, CLP Regulation, ChemVerbotsV (Chemicals Prohibition Ordinance), Decopaint Directive, GefStoffV (Ordinance on Hazardous Substances), VDL-RL 01, Council Directive 92/112/EEC, 25. BImSchV (25th Federal Immission Protection Ordinance), Biocidal Products Regulation (BPR), VerpackG (German Packaging Act), etc.<sup>7</sup> Moreover, the installation material shall not contain as constituents<sup>8</sup> any substances with the following properties:

---

<sup>1</sup> TRGS 610, substitutes and substitute procedures for high-solvent-content primers and adhesives for floor coverings, March 1998

<sup>2</sup> DIN EN 923:2008-06, Adhesives - Terms and definitions

<sup>3</sup> Under the REACH Regulation<sup>17</sup>, Annex XVII, No 47, cement-containing preparations shall not be placed on the market if - in their ready-to-use form after addition of water - the content of soluble chromium VI exceeds 2mg/kg in dry matter of cement.

<sup>4</sup> The Environmental Label Jury can, at the suggestion of the Federal Environment Agency, include additional adhesives and installation materials.

<sup>5</sup> DIN EN 12004:2014-02, Adhesives for tiles - Requirements, evaluation of conformity, classification and designation.

<sup>6</sup> DIN EN 13888:2009-1, Grout for tiles - Requirements, evaluation of conformity, classification and designation.

<sup>7</sup> Provided that the specific product is subject to additional substance restrictions resulting from other provisions such provisions shall also be complied with.

<sup>8</sup> Constituents are substances added to the product as such or as a component of mixtures in order to achieve or influence certain product properties as well as those required as chemical decomposition products to achieve the product properties. This does not include, for example, minimised residual monomers. Also excluded is methanol as a decomposition product of SMP adhesives.

- a) Substances that have been identified as substances of very high concern under the European Chemicals Regulation REACH<sup>9</sup> and have been included in the list (so-called "Candidate List") set up in accordance with REACH, Article 59 (1)<sup>10</sup>.
- b) Substances that are classified in the following hazard categories in accordance with the CLP Regulation or meet the criteria for such classification <sup>11,12</sup>:
  - ♦ carcinogenic of category Carc. 1A or Carc. 1B
  - ♦ germ-cell mutagenic of category Muta. 1A or Muta. 1B
  - ♦ reprotoxic of category Repr. 1A or Repr. 1B
  - ♦ acutely toxic of category Acute Tox. 1 or Acute Tox. 2
  - ♦ toxic to specific target organs of category STOT SE 1, STOT RE 1

The H-Statements corresponding to the hazard classes and hazard categories can be seen from Appendix B.

- c) Substances classified in TRGS 905<sup>13</sup> as:
  - ♦ carcinogenic (K1A, K1B),
  - ♦ mutagenic (M1A , M1B),
  - ♦ reprotoxic (R<sub>F</sub>1A, R<sub>F</sub>1B, R<sub>D</sub>1A, R<sub>D</sub>1B).
- d) Substances with other hazardous properties being present in concentrations that require a classification and labelling of the finished product with a GHS hazard pictogram for health and environmental hazards. Exempted are installation materials which because of their high pH value during processing must be labelled with the GHS hazard pictogram GHS05 (corrosion) or GHS07 (exclamation mark). An exception also applies for in-can preservatives for aqueous installation materials listed in "List of in-can preservatives approved in construction products" (Appendix C).
- e) Environmentally Hazardous Components  
 The final product shall not be classified as H400. In addition, the substances classified and labelled as hazardous to the environment -with either H410, H411 and/or H412- shall be limited in the installation material employing the following calculation model:
  - ♦  $M * 100 * H410 + 10 * H411 + H412 \leq 11.0 \%$

Where:

---

<sup>9</sup> Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH),

<sup>10</sup> The Candidate List as amended at the time of filing the application shall be applicable. For the Candidate List, as amended, please go to: <https://echa.europa.eu/candidate-list-table>

<sup>11</sup> The harmonised classifications and labelling of hazardous substances can be seen from Part 3 of Annex VI to the CLP Regulation. In addition, the European Chemicals Agency's (ECHA) website provides public access to a comprehensive classification and labelling inventory which also includes the manufacturers' self-classifications of hazardous substances: [ECHA classification & labelling inventory](#)

<sup>12</sup> Substances with additional hazardous properties (among others: CMR substances of category 2) are not excluded here but are reduced by the emission evaluation according to the AgBB scheme (see paragraph 3.3 - Indoor Air Quality).

<sup>13</sup> TRGS 905, List of carcinogenic, mutagenic or reprotoxic substances of the Committee on Hazardous Substances (AGS): [TRGS 905](#). The TRGS 905 list, as amended at the time of filing the application, shall be applicable (last amended in May 2018). The TRGS lists those CMR substances where no harmonised classification exists so far or where the Committee on Hazardous Substances arrives at a different classification. The total CMR list of the statutory accident insurance may also be used as a tool: <https://www.reach-clp-biozid-helpdesk.de/de/Glossar/C-D/CMR.html>.



- ♦ H410 corresponds to the concentration of substances classified as H410 in percent
- ♦ H411 corresponds to the concentration of the substances classified as H411 in percent
- ♦ H412 corresponds to the concentration of the substances classified as H412 in percent
- ♦ M is the multiplying factor for H410 in combination with the substance's LC50, EC50 or NOEC value and biodegradable in accordance with the classification rules of the CLP Regulation (2. ATP of CLP-Regulation, table 4.1.3).<sup>14</sup>

Where there is no information on a substance's aquatic hazard available as data on toxicity, biodegradability or bioaccumulation the substance shall be regarded as a worst case, i.e. as hazardous to the aquatic environment H410 with the multiplying factor of 1000. In-can preservatives as specified in Appendix C shall be exempted from this requirement.

### **Compliance Verification**

*The applicant shall declare compliance with the requirements in Annex 1. In addition, the applicant shall specify the trade names and suppliers of all individual intermediates of the installation materials as well as their percentage<sup>15</sup> and their function in the manufactured installation material (Annex 2). For compliance with the criteria the applicant shall additionally present declarations from the manufacturers or distributors of the intermediates used (Annex 3) as well as the appropriate Material Safety Data Sheets of the installation material and the intermediates used (Annex 4).*

### **3.2 Indoor Air Quality**

The products under paragraph 2 shall not exceed the following emission values in the test chamber in conformity with the „Vorgehensweise bei der gesundheitlichen Bewertung der Emissionen von flüchtigen organischen Verbindungen (VOC) aus Bauprodukten (health risk assessment process for emissions of volatile organic compounds (VOCs) from building products“<sup>16</sup> developed by the Ausschuss zur gesundheitlichen Bewertung von Bauprodukten (Committee for Health-related Evaluation of Building Products):

---

<sup>14</sup> CLP-Verordnung (Einstufung, Kennzeichnung und Verpackung) (EG Nr. 1272/2008 [https://www.reach-clp-biozid-helpdesk.de/DE/CLP/Rechtstexte/Rechtstexte\\_node.html](https://www.reach-clp-biozid-helpdesk.de/DE/CLP/Rechtstexte/Rechtstexte_node.html))

<sup>15</sup> For all components, exact quantities or ranges (in % by weight) must be stated.

<sup>16</sup> "Health risk assessment process for emissions of volatile organic compounds (VOCs) from building products", Homepage of the German Umweltbundesamt (Federal Environment Agency) <https://www.umweltbundesamt.de/en/topics/health/commissions-working-groups/committee-for-health-related-evaluation-of-building>

Substance	3 <sup>rd</sup> Day	Final Value (28 <sup>th</sup> Day)
Total organic compounds within the retention range without acetic acid C <sub>6</sub> – C <sub>16</sub> (TVOC <sub>spez</sub> )	≤ 1000 µg/m <sup>3</sup>	≤ 60 µg/m <sup>3</sup>
Acetic acid	≤ 2000 µg/m <sup>3</sup>	≤ 140 µg/m <sup>3</sup>
Total organic compounds within the retention range > C <sub>16</sub> – C <sub>22</sub> (TSVOC)	-	≤ 50 µg/m <sup>3</sup>
C substances <sup>17</sup>	≤ 10 µg/m <sup>3</sup> <b>total</b>	≤ 1 µg/m <sup>3</sup> <b>per single value</b>
Total VOC without NIK <sup>18, 19</sup>		≤ 40 µg/m <sup>3</sup>
R value <sup>13</sup>	-	≤ 1
Formaldehyde	-	≤ 0.05 ppm
Other aldehydes <sup>20</sup>	-	≤ 0.05 ppm

Sampling as well as storage and transport, manufacture and preparation of the test specimen as well as the emission measurement shall be done in accordance with the BAM Test Method (Appendix D) (BAM - Bundesanstalt für Materialforschung und -prüfung - Federal Institute for Material Research and Testing). As for the rest, the general requirements of DIN EN 16516 shall be complied with. Based on the AgBB-requirements the sum of volatile organic compounds (TVOC) shall be determined in accordance with Chapter 8.2.6.1, para. 2 of DIN EN 16516 (target and non-target compounds, identified and non-identified compounds) with TVOC<sub>spez</sub> (without acetic acid)<sup>21</sup>. The requirements are aimed at limiting the contribution of flooring adhesives to the content of volatile organic compounds in the indoor air in an average-sized living room with an air exchange rate of 0.5 per hour after 28 days to 0.06 mg/m<sup>3</sup>. The field of use shall be clearly indicated on the container (for floors and walls; for walls only or for floors only). In cases where the adhesives are labelled for use on walls only or for use on floors only the test chamber shall be loaded depending on the field of use: 0.4 m<sup>2</sup>/m<sup>3</sup> for products for use on floors only, 1 m<sup>2</sup>/m<sup>3</sup> for products for use on walls only. In cases of doubt testing shall be done at maximum load of 1.4 m<sup>2</sup>/m<sup>3</sup> for products for use on walls and floors. Then no field of use need to be indicated. The loading of the test chamber shall be 0.4 m<sup>2</sup>/m<sup>3</sup> for products for use on floors. The test may be stopped from the 7<sup>th</sup> day after loading if the admissible emission values of day 28 are reached prematurely and if, compared with the measurement of day 3, no rise in the concentration of any of the substances to be detected has been observed.

The optional odour test pursuant to para. 3.4 shall be performed in combination with the indoor air quality test.

<sup>17</sup> C substances = carcinogenic substances; according to Carc.Cat.1 / Carc. 1A and Carc.Cat.2 / Carc. 1B pursuant to EU classification and TRGS 905

<sup>18</sup> including non-identifiable substances

<sup>19</sup> LCI = lowest concentration of interest

<sup>20</sup> Other aldehydes that can be determined using the BAM test method, (Method for the measurement of emissions of formaldehyde and other volatile compounds). Aldehydes can also be determined by use of the DNPH method (DNPH - dinitrophenylhydrazine) (DIN ISO 16000-3).

<sup>21</sup> Without acetic acid

### **Compliance Verification**

The applicant shall submit a test report in accordance with DIN EN 16516 confirming compliance with the above requirement. The test report shall be prepared by a testing laboratory accredited for such testing by BAM - Bundesanstalt für Materialforschung und -prüfung (Federal Institute for Materials Research and Testing)<sup>22</sup>.

The format of the test report is based on DIN EN 16516 [paragraph 10], (the AgBB evaluation shall be conducted by use of the ADAM evaluation mask<sup>23</sup>).

### **3.3 Odour Test (optional)**

The product may come with a label on the package/container declaring the product to be "low-odour". Such claim does, however, require an odour test to be conducted in combination with the emissions test under para. 3.2 "Indoor Air Quality". The odour intensity of the flooring adhesives and other installation materials shall not exceed 7 pi after 28 days if the products are to be labelled "low-odour".

### **Compliance Verification**

The applicant shall present a test report pursuant to DIN ISO 16000-28<sup>24</sup> in combination with VDI 4302.

### **3.4 Special Substance Requirements**

#### **3.4.1 Alkylphenol Ethoxylate**

No products containing alkylphenol ethoxylates and/or their derivatives shall be added to the installation material.

#### **3.4.2 Plasticizers**

No products containing plasticising substances from the group of phthalates or the group of organophosphates may be added to the installation material.

Here, the following shall apply:

- Viscosity-regulating substances that do not require labelling under the CLP Regulation may be used for dispersion-based flooring adhesives in amounts of up to 5 percent by weight in the final product.
- Viscosity-regulating substances that do not require labelling under the CLP Regulation may be used for SMP-based adhesives in amounts of up to 15 percent by weight in the final product.

#### **3.4.3 Perfluorinated and Polyfluorinated Chemicals**

Neither perfluorinated nor polyfluorinated chemicals (PFCs), as for example, fluorocarbon resins and fluorocarbon dispersions, perfluorinated sulfonic and carboxylic acids as well as substances

---

<sup>22</sup> The current list of accredited testing laboratories can be found at: [https://www.blauer-engel.de/downloads/vergabegrundlagen\\_en/Testing-Institutes.pdf](https://www.blauer-engel.de/downloads/vergabegrundlagen_en/Testing-Institutes.pdf)

<sup>23</sup> Other evaluation tools may be used, as RAL will receive a similar result representation relative to the ADAM mask for evaluating the results. The comparability must be confirmed by the testing institute.

<sup>24</sup> DIN ISO 16000-28 - Indoor air - Part 28: Determination of odour emissions from building products using test chambers

that may possibly be broken down into these chemicals may be used. This shall also apply to PFC-treated intermediates.

#### **3.4.4 Oxidizable Fatty Acids and Fatty Acid Esters**

The installation materials as well as the intermediates used (e.g. polymer dispersions, resins or similar components) shall not contain as constituents any oxidizable fatty acids or oxidizable fatty acid esters<sup>25</sup>.

#### **3.4.5 Organotin Compounds**

Organotin compounds shall not be used. The use of organotin compounds as catalyst for the curing reaction of SMP-based adhesives in accordance with the Recommendation of the Bfr XV Silicones shall be exempted from this requirement<sup>26</sup>.

#### **Compliance Verification - Paras. 3.4.1 - 3.4.5**

*The applicant shall establish compliance with the requirement by submitting the corresponding declarations under Annex 3 to the Contract pursuant to DE-UZ 113 from the manufacturers or distributors of the polymer dispersions, resins or similar components (binders) used and presents the relevant Material Safety Data Sheets of the installation material and the intermediates used (Annex 4).*

### **3.5 Additional Substance Requirements**

Notwithstanding paragraph 3.1, the substances listed in the following paragraphs may be contained in or separated from the product, provided that they meet the requirements listed below.

#### **3.5.1 Preservatives**

The installation materials under para. 2 must not contain any biocides, except for the in-can preservatives for aqueous installation materials listed in Appendix C "List of approved in-can preservatives" in the concentrations specified therein.

#### **Compliance Verification**

*The applicant shall declare compliance with the requirement under Annex 1 to the Contract pursuant to DE-UZ 113.*

### **3.6 Special Requirements**

#### **3.6.1 Fitness for Use**

The installation materials under paragraph 2 shall meet the usual quality standards for fitness for use of the corresponding product group.

---

<sup>25</sup> Natural resins (tall oil resins, rosin or the like) may contain unsaturated fatty acids (tall oil resins). These unsaturated fatty acids are oxidizable and release -as decomposition products- saturated and unsaturated aldehydes that may lead to increased odour - even after some time. That is why the natural resins used need to be processed so that they practically do not contain any unsaturated fatty acids/fatty acid esters (tall oil resins or the like).

<sup>26</sup> Database „BfR Recommendations on Food Contact Materials“: [https://bfr.ble.de/kse/faces/DBEmpfehlung\\_en.jsp?filter=clear](https://bfr.ble.de/kse/faces/DBEmpfehlung_en.jsp?filter=clear)

### **Compliance Verification**

*The applicant shall declare compliance with the requirement in Annex 1 to the Contract pursuant to DE-UZ 113.*

#### **3.6.2 Advertising Messages**

The type of installation material pursuant to paragraph 2 shall be given on the product container together with the product designation.

- Advertising messages shall not include any notes that would play down risks in terms of Article 25, para. 4 of the CLP Regulation 2008/1272/EC as, for example, „non-toxic“, „non-hazardous to health“ and the like.
- Advertising messages including name components or designations, such as „organic“, „eco“, „natural“, „fung“, „insect“ or „nano“ and the like shall not be permitted.
- Provided that the requirement laid down in paragraph 3.3 "Odour Test" is met the installation material may be declared "low-odour".
- Exceptions: Installation materials in accordance with TRGS 610 may be declared „solvent-free in accordance with TRGS 610“.

### **Compliance Verification**

*The applicant shall declare compliance with the requirement in Annex 1 to the Contract and submit both a safety data sheet and a technical data sheet.*

#### **3.6.3 General Information/Instructions**

The container/package text and the technical data sheet shall include the following instructions in addition to the P-phrases required under the CLP Regulation (EC) No 1272/2008 in an easy-to-read form (other similar wording / P phrases may be used):

- „Keep out of the reach of children“
- „Ensure good ventilation during use and drying“
- „Do not eat, drink or smoke when using this product“
- „In case of contact with skin or eyes, rinse immediately with plenty of water“
- „Do not allow product to reach sewage system, water course or soil“
- „Clean tools with soap and water immediately after use“ (applies only to water-based products).
- „Give only empty containers to recycling. Dried product residues may be disposed of as domestic waste“
- „Product contains:..... (indication of the name(s) of the preservative(s) pursuant to Appendix C, para. 1); For information for allergic people, please call: .....“<sup>27</sup>

Additional instructions for SMP adhesives:

- „Methanol separates during hardening“
- „Ensure constant ventilation when using this product“
- „Ensure proper ventilation for several days after laying the flooring“
- „Wear protective gloves“

---

<sup>27</sup> Calls are charged at landline rate

Additional instructions for surfacers:

- „Wear protective gloves“
- „Storage conditions: Keep in dry and cool place. Reseal container tightly immediately after use.“

The Technical Data Sheet of cement-based surfacers shall indicate the shelf-life and the best-before date shall be placed on the container.

Additional instructions for GHS05 or GHS07-labelled products (other similar wording or P-phrases may be used):

- „Always wear safety glasses.“
- „If adhesive or installation material gets into contact with your eyes rinse immediately with plenty of water and see an ophthalmologist.“
- „Always wear heavy-duty waterproof gloves to protect your hands.“
- „Always wear long trousers.“
- „Avoid prolonged skin contact with the adhesive or installation material. Rinse affected areas immediately with plenty of water.“
- „The longer fresh adhesive or installation material remains on your skin the greater the risk of severe skin damage.“
- „Keep children away from fresh adhesive or installation material.“

The shelf-life shall be specified in the Technical Data Sheet of GHS05 or GHS07-labelled products and the best-before date shall be given on the container.

The components of the installation materials under paragraph 2 shall be listed in the Technical Data Sheets in accordance with VdL Directive on „Bautenanstrichstoffe“ (Building Coating Materials) - VdI-RL 01/June 2004.

Also, the container text shall include a prominent reference to the Technical Data Sheet and as to where the latter may be obtained as well as the manufacturer’s phone number at which consumers may obtain additional information.

If the product contains a preservative the container text shall additionally include a corresponding note and a phone number of the installation material manufacturer where consumers can get additional information. If no preservatives are used the container text may include the note: „preservative-free.“

### **Compliance Verification**

*The applicant shall declare compliance with the requirement in Annex 1 to the Contract and submit the corresponding Technical Data Sheet as well as the container text.*

## **4 Applicants and Parties Involved**

Manufacturers of final products according to Paragraph 2 shall be eligible for application.

Parties involved in the award process are:

- RAL gGmbH to award the Blue Angel Environmental Label,
- the federal state being home to the applicant’s production site,
- Umweltbundesamt (German Environmental Agency) which after the signing of the contract receives all data and documents submitted in applications for the Blue Angel in order to be able to further develop the Basic Award Criteria.

## **5 Use of the Environmental Label**

The use of the Environmental Label by the applicant is governed by a contract on the use of the Environmental Label concluded with RAL gGmbH.

Within the scope of such contract, the applicant undertakes to comply with the requirements under Paragraph 3 while using the Environmental Label.

Contracts on the Use of the Environmental Label are concluded to fix the terms for the certification of products under Paragraph 2. Such contracts shall run until December 31, 2023. They shall be extended by periods of one year each, unless terminated in writing by March 31, 2023 or March 31 of the respective year of extension.

After the expiry of the contract, the Environmental Label may neither be used for labelling nor for advertising purposes. This regulation shall not affect products being still in the market.

The applicant (manufacturer) shall be entitled to apply to RAL gGmbH for an extension of the right to use the ecolabel on the product entitled to the label if it is to be marketed under another brand/trade name and/or other marketing organisations.

The Contract on the Use of the Environmental Label shall specify:

- Applicant (manufacturer)
- Brand/trade name, product description
- Distributor (label user), i.e. the above-mentioned marketing organisations.

© 2021 RAL gGmbH, Bonn

## Appendix A Reference List (Legislation, Standards, Literature)

- [1] DIN EN 923 - Adhesives - Terms and definitions
- [2] DIN EN 12004 Part 1 - Adhesives for ceramic tiles - Part 1: Requirements, assessment and verification of constancy of performance, classification and marking
- [3] DIN EN 13813 Screed material and floor screeds - Screed materials - Properties and requirements
- [4] DIN EN 13888 Grout for tiles - Requirements, evaluation of conformity, classification and designation
- [5] DIN ISO 16000-3 - Indoor air - Part 3: Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air - Active sampling method
- [6] DIN ISO 16000-28 - Indoor air - Part 28: Determination of odour emissions from building products using test chambers
- [7] DIN EN 16516: Construction products - Assessment of release of dangerous substances - Determination of emissions into indoor air
- [8] AgBB Requirements for the Indoor Air Quality in Buildings: Health-related Evaluation Procedure for Emissions of Volatile Organic Compounds (VVOC, VOC and SVOC) from Building Products (current version); Homepage of the German Umweltbundesamt (Federal Environment Agency) <https://www.umweltbundesamt.de/en/topics/health/commissions-working-groups/committee-for-health-related-evaluation-of-building>
- [9] TRGS 610 Substitutes and substitute procedures for high-solvent-content primers and adhesives for floor coverings
- [10] TRGS 905, List of carcinogenic, mutagenic or reprotoxic substances of the Committee on Hazardous Substances (AGS): [TRGS 905](#)
- [11] Untersuchung und Ermittlung emissionsarmer Klebstoffe und Bodenbeläge. UBA-Projekt-Nr. 298 95 308, UBA-Texte 27/03, Umweltbundesamt, Berlin, 2003. <https://www.umweltbundesamt.de/en/publikationen/untersuchung-ermittlung-emissionsarmer-klebstoffe>



## Appendix B Excluded hazard classes and hazard categories

This table lists H-Statements corresponding to the hazard classes and hazard categories from para 3.1 General Substance Requirements in accordance with the CLP Regulation (EG) Nr. 1272/2008.

<b>CLP Regulation (EC) No. 1272/2008</b>		
<b>Hazard categories</b>	<b>Hazard statements</b>	
	<b>H Phrases</b>	<b>Wording</b>
<b>Carcinogenic substances</b>		
Carc. 1A	H350	May cause cancer.
Carc. 1B	H350	May cause cancer.
Carc. 1A, 1B	H350i	May cause cancer if inhaled.
<b>Germ cell mutagenic substances</b>		
Muta. 1A	H340	May cause genetic defects.
Muta. 1B	H340	May cause genetic defects.
<b>Reprotoxic substances</b>		
Repr. 1A / 1B	H360D	May damage the unborn child.
Repr. 1A / 1B	H360F	May damage fertility.
Repr. 1A / 1B	H360FD	May damage fertility. May damage the unborn child.
Repr. 1A / 1B	H360Df	May damage the unborn child. Suspected of damaging fertility.
Repr. 1A / 1B	H360Fd	May damage fertility. Suspected of damaging the unborn child.
<b>Acute toxicity substances</b>		
Acute Tox. 1 Acute Tox. 2	H300	Fatal if swallowed.
Acute Tox. 1 Acute Tox. 2	H310	Fatal in contact with skin.
Acute Tox. 1 Acute Tox. 2	H330	Fatal if inhaled.
<b>Substances with specific target organ toxicity</b>		
STOT SE 1	H370	Causes damage to organs.
STOT RE 1*	H372	Causes damage to organs through prolonged or repeated exposure.
<b>Environmentally hazardous substances</b>		
Aquatic acute 1	H400	Very toxic to aquatic life
Aquatic chronic 1	H410	Very toxic to aquatic life with long-lasting effects
Aquatic chronic 2	H411	Toxic to aquatic life with long-lasting effects
Aquatic chronic 3	H412	Harmful to aquatic life with long-lasting effects

\* is the classification and toxicological justification of the substance based on the classification of the respirable fraction of the substance (dusts) and does not refer to the substance in general, the classification STOT RE 1 is no exclusion criterion according to para. 3.1 General Substance Requirements.

## Appendix C List of approved in-can preservatives- NEW - valid from 01.12.2020

The following active substances or active substances combinations can alternatively be used in a total of  $\leq 400$  ppm from the individual active substances for low-emission flooring adhesives and other installation materials. In addition, the preservation of the preliminary products must be dimensioned so that the preservation of the end product corresponds to Appendix C. Labelling the product with H317 is not permitted.

Allowed preservation	CAS No.	Content [ppm]
DBDCB	35691-65-7	400
BIT	2634-33-5	400
Bronopol	52-51-7	200
Sodium pyrithione	3811-73-2	200
Zinc pyrithione	13463-41-7	200
Combination CIT/MIT (3:1)	55965-84-9	Total < 15
CIT <sup>28</sup>	26172-55-4	
TiO <sub>2</sub> AgCl in relation to AgCl	7783-90-6	100
IPBC	55406-53-6	80
<b>Not allowed active substances<sup>29</sup></b>		< 15
Total from		
BBIT	4299-07-4	
MIT	2682-20-4	
OIT	26530-20-1	
DTBMA	2527-58-4	

Only those substances (active substances or biocidal products) may be used as preservatives for which an active substance dossier on the assessment as in-can preservatives (product type 6) has been submitted within the scope of the Biocidal Products Regulation ((EU) No 528/2012). If following the assessment an inclusion of the active substance in the Union List of approved active substances for product type 6 is denied the use of these substances shall no longer be permitted. This also applies to formaldehyde-releasing agents.

### Admission process for other substances

Other preservatives may be used if a MAK value is available and/or sufficient data regarding inhalation toxicology and analytics on the pure active substance and, if applicable, relevant degradation products, isomers and impurities, as well as other by-products of the substance and/or sufficient examinations relating to inhalative exposure are submitted to the Federal Environmental Agency for evaluation and setting of a maximum content.

<sup>28</sup> Provisional authorisation of the biocidal product ACTICIDE C1 until 16 March 2024.

<sup>29</sup> The active substances must not be actively added for in-can preservation of Blue Angel products.

## Appendix C List of approved in-can preservatives - OLD - valid until 01.12.2020

Alternatively, the following active substances or active substance combinations may be used for in-can preservation:

Active Substances/Active Substances Combination	Content
a) Titanium dioxide/silver chloride	≤ 100 ppm in relation to silver chloride
b) 2-Methyl-2H-isothiazol-3-one (MIT) / 1,2-benzisothiazol-3(2H)-one (BIT) in a ratio of 1:1	≤ 200 ppm
c) 5-Chloro-2-methyl-4-isothiazolin-3-one (CIT) / 2-methyl-2H-isothiazolin-3-one (MIT) in a ratio of 3:1	≤ 15 ppm
d) 3-Jodo-2-propinyl butylcarbamate (IPBC)	≤ 80 ppm
e) 1,2- Benzisothiazol-3(2H)-one (BIT)	≤ 200 ppm
f) 2-Bromo-2-nitropropane-1,3-diol (BNPD)	≤ 200 ppm
g) BNPD <sup>30</sup> + CIT/MIT (3:1) <sup>31</sup>	≤ 130 ppm + ≤ 15 ppm
h) BNPD <sup>30</sup> + CIT/MIT (3:1) <sup>31</sup>	≤ 150 ppm + ≤ 10 ppm
i) BNPD <sup>30</sup> + CIT/MIT (3:1) <sup>31</sup>	≤ 170 ppm + ≤ 5 ppm
j) MIT/BIT <sup>32</sup> (1:1) + CIT/MIT (3:1) <sup>31</sup>	≤ 150 ppm + ≤ 12,5 ppm
k) MIT/BIT <sup>32</sup> (1:1) + CIT/MIT (3:1) <sup>31</sup>	≤ 125 ppm + ≤ 15 ppm
l) 1,2-Dibromo-2,4-dicyanobutane (DBDCB)	≤ 500 ppm
m) BIT <sup>33</sup> + CIT/MIT (3:1) <sup>31</sup>	≤ 150 ppm + ≤ 12,5 ppm
n) BNPD <sup>30</sup> + MIT/BIT <sup>32</sup> (1:1)	≤ 120 ppm + ≤ 75 ppm
o) Zinc pyrithione (ZNP) + BIT <sup>33,34</sup>	≤ 100 ppm + ≤ 100 ppm
p) Zinc pyrithione (ZNP) + MIT/BIT <sup>32</sup> (1:2 to 2:1)	≤ 50 ppm + ≤ 150 ppm
q) BNPD <sup>30</sup> + BIT <sup>33</sup>	≤ 100 ppm + ≤ 100 ppm
r) Sodium pyrithione (NaP) + BIT <sup>33</sup>	≤ 50 ppm + ≤ 150 ppm
s) N-(3-aminopropyl)-N-dodecylpropane-1,3-diamine (CAS 2372-82-9) + MIT/BIT <sup>32</sup> (1:1)	≤ 81 ppm + ≤ 150 ppm
t) MIT/BIT <sup>32</sup> (1:1) + silver chloride	≤ 185 ppm + ≤ 15 ppm

Only those substances (active substances or biocidal products) may be used as preservatives for which an active substance dossier on the assessment as in-can preservatives (product type 6) has been submitted within the scope of the Biocidal Products Regulation ((EU) No 528/2012). If following the assessment an inclusion of the active substance in the Union List of approved

<sup>30</sup> BNPD = see f)

<sup>31</sup> CIT/MIT = see c)

<sup>32</sup> MIT/BIT = see b)

<sup>33</sup> BIT = see e)

<sup>34</sup> Zinc oxide up to maximal 500 ppm is additional permitted as technical adjuvant

active substances for product type 6 is denied the use of these substances shall no longer be permitted. This also applies to formaldehyde-releasing agents.

**Admission process for other substances**

Other preservatives may be used if a MAK value is available and/or sufficient data regarding inhalation toxicology and analytics on the pure active substance and, if applicable, relevant degradation products, isomers and impurities, as well as other by-products of the substance and/or sufficient examinations relating to inhalative exposure are submitted to the Federal Environmental Agency for evaluation and setting of a maximum content.

## **Appendix D Test Method for VOC Emissions**

### **Test Method for Determining Emissions of Volatile Organic Compounds for Award of the Blue Angel Eco-Label pursuant to DE-UZ 113**

The test method for determining the emissions of volatile organic compounds is principally based on the requirements of DIN EN 16516 and the AgBB scheme.

#### Table of Contents

1. Definitions
2. Equipment
3. Test material
4. Emission test chamber or emission test cell measurement
5. Air sampling and analytical methods
6. Evaluation and test report
7. Testing laboratories
8. Literature

#### **1. Definitions**

##### **Emission Test Chamber**

Closed container with controlled operating parameters for the determination of volatile organic compounds emitted from building materials.

##### **Area-specific Air Flow Rate ( $q$ [ $\text{m}^3/\text{m}^2\text{h}$ ])**

Ratio between air-flow rate and the emissive surface area of the test specimen.

##### **Air Exchange Rate ( $n$ [ $\text{h}^{-1}$ ])**

Ratio between the volume of pure air introduced into the emission test chamber every hour and the free volume of the emission test chamber which is to be determined in identical units, expressed in air changes per hour.

##### **Air Flow Rate ( $Q_V$ [ $\text{m}^3/\text{h}$ ])**

Volume of air introduced into the emission test chamber per unit of time.

##### **Air Velocity ( $v$ [ $\text{m}/\text{s}$ ])**

Air speed above the surface of the test specimen (distance: 10 mm).

##### **Product Loading Factor ( $L$ [ $\text{m}^2/\text{m}^3$ ])**

Ratio between the emissive surface area of the test specimen and the emission test chamber volume.

##### **Test Specimen**

Part of the sample that has been specially prepared for emission testing in an emission test chamber in order to simulate the emission behaviour of the material or product to be tested.

### **Total Volatile Organic Compounds without Acetic Acid (TVOC<sub>spez.</sub> without acetic acid)**

The sum of concentrations of substance-specifically quantified LIC substances as well as of the non-identified and non-target compounds quantified via the toluene equivalent in a concentration of  $\geq 5 \mu\text{g}/\text{m}^3$  each which elute between n-hexane and n-hexadecane from a gas chromatography column (capillary column containing 5% phenyl- / 95% methylpolysiloxane), including these compounds. SVOC with LIC value shall be figured into the TVOC<sub>spez.</sub> calculation (without acetic acid). Emissions of acetic acid shall not be figured into the TVOC<sub>spez.</sub> calculation (without acetic acid).

### **Volatile Organic Compounds (VOCs)**

General meaning: organic compounds emitted by the test specimen and detected in the chamber air. In terms of this test method these are the identified and non-identified organic compounds eluting between n-hexane and n-hexadecane from a gas chromatography column (capillary column containing 5% phenyl- / 95% methylpolysiloxane), including these compounds.

### **Semi-volatile organic compounds (SVOC)**

Less volatile organic compounds (both identified and non-identified) eluting between n-hexadecane and n-docosane from a gas chromatography column (capillary column containing 5% phenyl- / 95% methylpolysiloxane).

### **Total Semi-Volatile Organic Compounds (TSVOC)**

The sum of all individual substances  $\geq 5 \mu\text{g}/\text{m}^3$  eluting between n-hexadecane and n-docosane from a gas chromatography column (capillary column containing 5% phenyl- / 95% methylpolysiloxane). SVOC with LIC value shall not be figured in the TSVOC calculation.

## **2. Equipment**

- Equipment for test material application
- Glass plates or glass dishes
- Template for the preparation of a test specimen (as well as non-emitting adhesive tape, glass rim or stainless steel templates)
- Toothed spatula TKB B1

The toothing has a triangular indentation dimensioned as follows:

Dimension			Tolerance
A	indentation spacing / tooth width	2.6 mm	$\pm 0.1 \text{ mm}$
B	indentation width / tooth space width	2.4 mm	$\pm 0.1 \text{ mm}$
C	indentation depth / tooth space depth	2.0 mm	$\pm 0.1 \text{ mm}$
$\gamma$	indentation angle	55 °	+/- 0.5 °

- Emission test chamber, see Chapter 4.
- Air sampling systems
- Adsorbents for air sampling pursuant to Chapter 5.

- Capillary gas chromatograph equipped with thermal desorption unit, linked to a mass spectrometer with evaluation unit
- Liquid chromatograph with UV-absorption detector or diode-array detector.

### **3. Test Material**

#### **3.1 Selection**

Testing should be done on samples produced no longer than 8 weeks ago. Products designed for wet-on-wet application supplied in a sealed container (e.g. can, cartridge) shall be tested no later than 4 month after sampling. The party ordering the test shall be responsible for the supply of fresh test material. Samples are usually supplied in the original container. The testing laboratory shall homogenize the contents and take a reference sample. The date of manufacture shall be indicated.

#### **3.2 Preparation of the Test Specimen**

Ready-to-use installation materials shall be tested as supplied. Others shall be mixed according manufacturer's instructions.

Depending on the type of installation material to be tested the test specimens shall be prepared in different ways.

The test specimen shall be prepared in strict accordance with the following instructions.

##### **3.2.1 Base Coats/Primers**

are liquid installation materials when being applied. They are used for the preparation of the surface of the underlying floor. This also includes, for example, conductive primers and anti-slip coatings.

##### **3.2.1.1 Procedure with Respect to Aqueous Products**

The sample is to be homogenized. If the manufacturer has not provided any binding information on the dry residue of the sample supplied the dry residue shall be determined on the basis of ISO 1625 by drying a separate partial sample at 105 °C until a constant weight is reached. Adjust and homogenize the sample using VOC-free water to a 10 % dry residue on the basis of the dry residue value indicated by the manufacturer or -by way of substitution- on the basis of the self-determined dry residue value. Pour as much of the, possibly, diluted sample into a weighed glass dish (see Chapter 2) as is needed to load the dish with 100 +/- 5 g/m<sup>2</sup>. Wave the dish to reach a uniform wetting of the bottom. Place the dish into the test chamber immediately thereafter. Make sure by re-weighing after the test that the weight of the sample film that has been dried in the test chamber is 10 +/- 1 g/m<sup>2</sup>, as expected.

##### **3.2.1.2 Procedure with Respect to Water-free Products**

Homogenize the sample components as described above and, if applicable, mix them homogeneously at a mixing ratio as specified by the manufacturer. Test an undiluted sample of 100 +/- 5 g/m<sup>2</sup>, as described above.

##### **3.2.2 Surfacing**

are powdered installation materials which become solid after being mixed with water. They are used to level out the underlying floor. This includes, for example, cement and plaster surfacing. Surfacing on the basis of dispersion or reaction resins shall be tested in the same manner as adhesives (see para. 3.2.3).

**Procedure:**

Mix the sample homogeneously according to manufacturer's instructions with VOC-free water. Let the mixture rest for about 5 minutes. Stir again. Apply a 3-mm uniform layer of the mixed sample over the entire surface of a glass plate (see Chapter 2.) and remove with a flat spatula. For this purpose, the rim of the loading area must be limited high enough by means of an emission-free auxiliary limitation (e.g. glass rim or stainless steel frame as template). Put the test specimen into the test chamber immediately after preparation together with the emission-free auxiliary limitation.

**3.2.3 Floor Covering and Wood Parquet Adhesives**

are liquid to paste-like installation materials when being applied. They are used to provide a strong adhesion between covering and underlying floor. This also includes, for example, contact adhesives and fixing materials.

**3.2.3.1 Procedure with Respect to Ready-to-Use Adhesives**

The sample is to be homogenized. Following this, the sample shall be applied in surplus weight on the pre-weighed glass plate (see Chapter 2) (for examples, see Chapter 4) and evenly spread in a single stroke using a toothed spatula TKB B 1 (work angle of about 60 °) so that an evenly structured sample covers the entire surface. Then, re-weigh the glass plate and document the quantity applied. The quantity applied should be 300 g/m<sup>2</sup>, as precisely as possible. A tolerance range of 300 ± 50 g/m<sup>2</sup> will be accepted. Should the weight fail to be within the above tolerance range a new test specimen will have to be prepared. Increasing the spatula's work angle will increase the applied quantity while decreasing the work angle will reduce the quantity applied. The entire application process should be completed within 3 minutes. Place the test specimen(s) into the test chamber immediately after completion of preparation.

**3.2.3.2 Procedure with Respect to 2-Component Adhesives and Powdered Adhesives**

Mix the sample homogeneously according to manufacturer's instructions. If water is used check if it is VOC-free. The test specimen is to be prepared analogously, as described in para. 3.2.3.1.

**3.2.4 Adhesive Tapes**

Unwind the material by turning the roll at least twice. Glue the product with its self-adhesive bottom side directly over the entire surface of the inert plate. If the product has a self-adhesive upper surface the cover sheeting shall be removed. The open edges of the adhesive tape shall not be covered.

**4. Emission Test Chamber Measurement**

The test chambers shall meet the requirements set out in [1]. These are in particular:

- High-purity air supply
- VOC-free and dust-free
- High-purity water supply
- Chamber walls of glass or stainless steel
- The use of sealants should be avoided to the greatest extent possible
- Chamber wall tempering recommended



The following test conditions shall be observed in conformity with [1]:

Temperature (T)	23 °C	±	1 K
Relative air humidity	50 %	±	5 %
Air flow velocity (v)	0.1 - 0.3 m/s		

The following loading factors (L) shall be used for determining the area-specific air flow rate (q) at an air exchange rate (n) of 0.5 h<sup>-1</sup>:

- ♦ 1.0 m<sup>2</sup>/m<sup>3</sup> for walls
- ♦ 0.4 m<sup>2</sup>/m<sup>3</sup> for floor and ceiling
- ♦ 0.05 m<sup>2</sup>/m<sup>3</sup> for small surfaces, e.g. repair surfacers, adhesive tapes depending on the application
- ♦ 0.007 m<sup>2</sup>/m<sup>3</sup> for very small surfaces, e.g. sealants, sealant tapes

A blank value determination shall be performed inside the chamber before loading the test chamber. The blank value shall not exceed 2 µg/m<sup>3</sup> for the individual substances and 0.5 µg/m<sup>3</sup> for carcinogenic (C) substances. The sum of all blank values of the individual substances shall not exceed 10 µg/m<sup>3</sup>. In order to determine the blank value of the test chamber the adsorber blank value is to be determined and deducted.

The test chamber measurement shall be conducted without interruption over the entire test period. A removal of the samples shall not be permitted.

## 5. Air Sampling and Analysis Methods

With respect to VOCs and SVOCs, sampling shall be done using Tenax followed by thermal desorption pursuant to [2] and evaluation by GC/MSD.

With respect to short-chain aldehydes and ketones sampling shall be done in accordance with [3] using cartridges containing a 2,4-dinitrophenylhydrazine (DNPH)-coated sorbent. Desorption shall be done by the use of acetonitrile. Separation and identification shall be done by HPLC coupled with UV absorption detector or diode array detector. When using a diode array detector quantification shall be done at 1 or 2 significant wave lengths (see DIN ISO 16000-3 [3]).

Sampling for short-chain carbonyl compounds using DNPH cartridges shall be conducted at the same time as the sampling by means of Tenax for determining VOCs and SVOCs, at least, however, at the following times:

- 3rd day after loading (72 + 3 h)
- 28th day of loading (28 ± 2 d)

Testing may be stopped prematurely (but not before the 7<sup>th</sup> day after loading) if the admissible final emission values of day 28 are reached prematurely and if, compared with the measurement of day 3, no rise has been observed in the concentration of any of the substances to be detected.

The sampling and analysis method described in the Appendix can be used for a wide range of emittable compounds. A list of compounds that may occur during emission measurements of building products can be seen from DIN ISO 16000-6 (Annex A) [2].

All substances shall be identified in accordance with the AgBB scheme, if possible, and, at least, the substances with LIC value I shall be quantified in a substance-specific manner. The quantification limit shall, to the extent feasible, be about 1 µg/m<sup>3</sup> for each VOC and SVOC. Carcinogenic substances of categories CARC 1A and CARC 1B (under Regulation (EC) No 1272/2008) as well as mutagenic and reprotoxic substances which are target compounds shall, to the extent necessary and feasible, be quantified and listed from a concentration of 1 µg/m<sup>3</sup>. The sum (TVOC<sub>spez.</sub> without acetic acid) of all identified target compounds (quantified using substance-specific calibration standards) plus all identified non-target compounds and all non-identified compounds (quantified using the TIC response factor for toluene) shall be determined for each measurement day using values quantified with > 5 µg/m<sup>3</sup> the retention time of which is between hexane and hexadecane. With respect to semi-volatile compounds (SVOCs), i.e. compounds the retention time of which is between n-hexadecane and n-docosane the sum (TSVOC) shall also be determined from all identified values quantified with > 5 µg/m<sup>3</sup>. SVOCs with LIC value shall be figured into the TVOC<sub>spez.</sub> calculation (without acetic acid) and not in the TSVOCs. Emissions of acetic acid shall not be figured into the TVOC<sub>spez.</sub> calculation (without acetic acid).

## 6. Evaluation and Test Report

The measured values are standardised to the standard conditions (adhesives: 300 g/m<sup>2</sup>, surfacers: 3-mm layer, aqueous primers/base coats: 10 g/m<sup>2</sup>, water-free primers/base coats: 100 g/m<sup>2</sup>) as follows:

Adhesives, primers, base coats:

Result (µg/m<sup>3</sup>) = measured value (µg/m<sup>3</sup>) x standard quantity applied (g/m<sup>2</sup>) / actual quantity applied (g/m<sup>2</sup>)

Surfacers:

Result (µg/m<sup>3</sup>) = measured value (µg/m<sup>3</sup>) x 3 (mm) / actual layer thickness (mm)

If possible, all compounds in a concentration equal to or greater than 1 µg/m<sup>3</sup> shall be identified and quoted with their CAS No. Individual substances in a concentration equal to or greater than 5 µg/m<sup>3</sup> shall be quoted with their concentration values. If the emitted substances are also detected in the equally determined blank value (max. 2 µg/m<sup>3</sup> or 0.5 µg/m<sup>3</sup> for C substances) the blank value shall - in order to simplify the procedure - be deducted from the test specimen's concentration value determined. As regards the total concentration and the concentration of the individual substances, the concentration values determined on day 3 and on day 28 shall at least be indicated.

For evaluation of the identified VOCs whose concentration is greater than 5 µg/m<sup>3</sup>, the quotient of the concentration value and the so-called LCI value (cf. [5]) shall be determined in accordance with the following formula:

$$R = \sum C_i/LIC_i$$

The LCI values to be entered in the calculation formula can be seen from table in [5].

The test report shall document the entire test as well as the complete evaluation for the product. For this purpose, the report shall provide the following information:

- Manufacturer,
- Accurate product designation (including lot, date of production, solids content (for base coats, primers),
- Date of Manufacture, date of receipt,
- Type of packaging,
- Date/period of testing,
- Preparation of test specimens (dimensions, mixing procedure, quantity applied, type of application procedure {application tool used}),
- Test conditions (type and size of chamber, temperature, relative air humidity, air exchange rate or air volume flow rate, volumetric load, area-specific air flow rate, time and duration of air sampling, volume and volume flow of air sampling),
- Name, CAS No and concentration of identified VOCs as well as concentration of non-identified VOCs of day 3 and day 28 as well as their total (TVOC<sub>DE-UZ113</sub>)
- Name, CAS No and concentration of identified SVOCs as well as concentration of non-identified SVOCs of day 28 as well as their total (TSVOC<sub>DE-UZ113</sub>),
- Name, CAS No and concentration of identified C substances and their total of day 3 and day 28
- Calculated R value of day 28
- Name, CAS No and concentration of short-chain carbonyl compounds with LIC Value of day 28 (determination in accordance with DIN ISO 16000-3). Indication of the formaldehyde and acetaldehyde concentration after 72 hours

## 7. Testing Laboratories

Emission testing shall only be performed by qualified testing laboratories.

Testing laboratories shall be considered qualified if they have the necessary equipment and a quality management system (or if they are accredited for these tests) and have demonstrated their capacity to perform such testing by successfully participating in relevant ring tests. Proof of compliance with these requirements shall be forwarded to the Bundesanstalt für Materialforschung und Prüfung (Federal Institute for Material Research and Testing, Division of Environment-related material and product properties / Emissions from Materials).

## 8. Literature

1. DIN EN 16516: Construction products - Assessment of release of dangerous substances - Determination of emissions into indoor air; German version EN 16516:2017

2. DIN ISO 16000-6: Indoor air - Part 6: Determination of volatile organic compounds in indoor and test chamber air by active sampling on Tenax TA® sorbent, thermal desorption and gas chromatography using MS or MS-FID (ISO/DIS 16000-6).
3. DIN ISO 16000-3: Indoor air - Part 3: Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air - Active sampling method (ISO 16000-3:2011).
4. Examination and determination of low-emission adhesives and floor coverings. UBA project No: 298 95 308, UBA texts 27/03, Umweltbundesamt (Federal Environment Agency), Berlin, 2003.
5. AgBB scheme: "Vorgehensweise bei der gesundheitlichen Bewertung der Emissionen von flüchtigen organischen Verbindungen (VOC) aus Bauprodukten" (health risk assessment process for emissions of volatile organic compounds (VOCs) from building products" - Homepage of the German Umweltbundesamt (Federal Environment Agency)  
<http://www.umweltbundesamt.de/themen/gesundheit/kommissionen-arbeitsgruppen/ausschuss-zur-gesundheitlichen-bewertung-von#textpart-1>