

KERAKOLL SpA Headquarter  
via Pedemontana, 25  
41049 Sassuolo (MO)  
Italy

## Test Report No. 59213-A011-AgBB-L

Test objective:	Evaluation according to AgBB scheme 2021
Article designation according to order:	Universal Wall Primer
Date of report:	20/08/2024
Number of pages of report:	20
Testing / responsible laboratory:	eco-INSTITUT Germany GmbH, Köln
Test objective fulfilled:	✓

Note:

The test results in the report refer exclusively to the test sample submitted by the manufacturer. The report is not permitted to be used in product and company advertising. The report may be published in full as technical documentation on the Internet with the written consent of eco-INSTITUT Germany GmbH. eco-INSTITUT Germany GmbH has recommended that the manufacturer repeats the test after 3 years at the latest. More information at [www.eco-institut.de/en/advertising](http://www.eco-institut.de/en/advertising)



Content

Sample View ..... 3

Statement of conformity with AgBB 2021 ..... 4

Summary statement of conformity with AgBB 2021 ..... 5

Laboratory report..... 6

1 Emission analysis..... 6

    1.1 Sample A011, Volatile organic compounds after 3 days..... 7

    1.2 Sample A011, Volatile organic compounds after 28 days ..... 11

Appendix ..... 14

    Sampling sheet..... 14

    List of calibrated Volatile Organic Compounds (VOC) ..... 15

    Definition of terms ..... 17

    Commentary on emission analysis..... 19

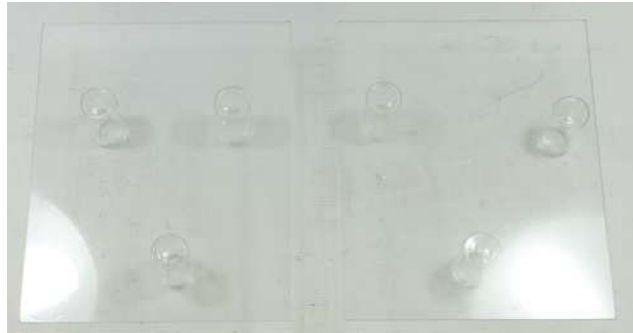
    Explanation of Specific Emission Rate SER ..... 20

## Sample View

Internal sample number (filled in by laboratory)

59213-A011

Photo of the test specimen: A011



Article designation according to order:

Universal Wall Primer

Sample/batch number according to order:

K41124107

Type of sample:

Primer

Date of production:

12/05/2024

Sampling by:

Alberto Spaggiari

Date of sampling:

30/05/2024

Location of sampling:

Warehouse

Receipt of sample / Condition upon delivery:

07/06/2024 / without objection

## Statement of conformity with AgBB 2021

The sample with the internal sample number 59213-A011 has been tested on behalf of **KERAKOLL SpA Headquarter**. The article description according to the order is **Universal Wall Primer**.

This evaluation is based on the test criteria of the scheme “Health-related Evaluation of Emissions of Volatile Organic Compounds (VVOC, VOC and SVOC) from Building Products” of the Committee for Health-Related Evaluation of Building Products (AgBB 2021).

The results documented in the test report were evaluated as follows.<sup>1</sup>

Test parameter	Result	Requirement	Requirement hold [yes/no]
<b>Emission analysis</b>			
<b>Measurement time: 3 days after test chamber loading</b>			
Sum VOC (C6-C16) <sup>1)</sup>	0.11 mg/m <sup>3</sup>	≤ 10 mg/m <sup>3</sup>	yes
Carcinogenic substances, cat. 1A and 1B acc. to Regulation (EC) No. 1272/2008 (and TRGS 905) (per substance)	≤ 0.01 mg/m <sup>3</sup>	≤ 0.01 mg/m <sup>3</sup>	yes
<b>Measurement time: 28 days after test chamber loading</b>			
Sum VOC (C6-C16) including SVOC with LCI <sup>1)</sup>	< 0.005 mg/m <sup>3</sup>	≤ 1.0 mg/m <sup>3</sup>	yes
Sum SVOC without LCI (C16-C22) <sup>1)</sup>	< 0.005 mg/m <sup>3</sup>	≤ 0.1 mg/m <sup>3</sup>	yes
R-value (dimensionless)	0.00	≤ 1	yes
Sum VOC without LCI	< 0.005 mg/m <sup>3</sup>	≤ 0.1 mg/m <sup>3</sup>	yes
Carcinogenic substances, cat. 1A and 1B acc. to Regulation (EC) No. 1272/2008 (and TRGS 905) (per substance)	≤ 0.001 mg/m <sup>3</sup>	≤ 0.001 mg/m <sup>3</sup>	yes

1) For sum VOC (C6-C16) and sum SVOC (C16-C22) only substances ≥ 5 µg/m<sup>3</sup> are considered.

<sup>1</sup> If a measurement result that slightly exceeds the specification is assessed as “not fulfilled”, this is based on the agreement of the “shared risk of measurement uncertainty (shared risk approach)”. According to this, the probability that the statement is correct is ≥ 50 %. Similarly, a result slightly below the specification value also only has a probability of ≥ 50 % of being compliant. I.e., the risk of making a false negative statement regarding the fulfilment of the specification is just as high as the risk of making a false positive statement (more information at [https://www.eco-institut.de/en/2019/07/measurement\\_uncertainty/](https://www.eco-institut.de/en/2019/07/measurement_uncertainty/)).



## Summary statement of conformity with AgBB 2021

The sample with the internal sample number 59213-A011, article description according to order: **Universal Wall Primer**, meets the emission requirements of the AgBB scheme.

Cologne, 20/08/2024

A handwritten signature in black ink, appearing to read 'M.A. Dobaj'.

Marc-Anton Dobaj, M.Sc. Crystalline Materials  
(Project management)

## Laboratory report

### 1 Emission analysis

#### Test method

DIN EN 16516:2020-10

Testing and evaluation of the release of dangerous substances;  
determination of emissions into indoor air

#### A011, Preparation of test specimen

Date:

02/07/2024

Test specimen preparation:

Application on glass; with a brush; application quantity 200 g/m<sup>2</sup>;  
drying / pre-conditioning outside of the test chamber for 72 hours

Masking of backside:

not applicable

Masking of edges:

not applicable

Relationship of unmasked  
edges to surface:

not applicable

Loading reference unit:

area-specific [m<sup>2</sup>]

Dimensions:

2 x 25.0 cm x 20.0 cm with 10.0 g application each

#### A011, Test chamber conditions according to DIN EN ISO 16000-9:2008-04

Chamber volume:

0.100 m<sup>3</sup>

Temperature:

23 °C ± 1 °C

Relative humidity:

50 % ± 1 %

Air pressure:

normal

Air:

cleaned

Air change rate:

0.5 h<sup>-1</sup>

Air velocity:

0.3 m/s

Loading:

1.0 m<sup>2</sup>/m<sup>3</sup>

Specific air flow rate:

0.5 m<sup>3</sup>/(m<sup>2</sup>·h)

Starting time of the test (t<sub>0</sub>):

05/07/2024

Air sampling:

3 days after test chamber loading  
28 days after test chamber loading

#### Analytics

Aldehydes and ketones:

DIN ISO 16000-3:2023-12

Limit of quantification:

2 µg/m<sup>3</sup>

Volatile organic compounds:

DIN ISO 16000-6:2022-03

Limit of quantification:

1 µg/m<sup>3</sup> (1,4-Cyclohexanedimethanol, Diethylene glycol,  
1,4-Butanediol: 5 µg/m<sup>3</sup>)

Note for analysis:

not specified

## 1.1 Sample A011, Volatile organic compounds after 3 days

### Test objective:

Volatile organic compounds (VOC), test chamber, air sampling 3 days after test chamber loading

### Test result:

Internal sample number: | 59213-A011

	Substance	CAS No.	RT [min]	Concentration+ calib. substances ≥ 1 µg/m³ uncalib. substances ≥ 1 µg/m³ DNPH ≥ 2 µg/m³ [µg/m³]	Toluene- equivalent substances ≥ 5 µg/m³ [µg/m³]	SER+ [µg/(m²·h)]	CMR Classifi- cation++	LCI AgBB 2021 [µg/m³]	R-value
	<b>Aromatic hydrocarbons</b>								
VOC	4-Phenylcyclohexene (4-PCH)	4994-16-5	21.68	2	< 5	1		300	0.01
	<b>Aliphatic hydrocarbons (n-, iso- and cyclo-)</b>								
VOC	n-Tetradecane	629-59-4	22.26	1	< 5	0.5		6000	0.00
	<b>Glycols, Glycol ethers, Glycol esters</b>								
VOC	Propylene glycol (Propane-1,2- diol)	57-55-6	7.22	15	6	7.5		2100	0.01
VOC	Diethylene glycol monobutyl ether	112-34-5	17.39	1	< 5	0.5		350	0.00
VOC	Dipropylene glycol monomethyl ether	34590-94-8	13.23	4	< 5	2		3100	0.00
VOC	Dipropylene glycol mono-n- butyl ether	29911-28-2	18.6	9	9	4.5		250	0.04
VOC	Tripropylene glycol monomethyl ether	20324-33-8	20.25	23	16	12		1200	0.02
VOC	Ethylidiglycol, (Diethylene glycol monoethyl ether, 2-(2- Ethoxyethoxy)ethanol)	111-90-0	13.32	47	39	24		350	0.13
	<b>Ketones</b>								
VVOC	Acetone	67-64-1		2	n. d.	1		120000	0.00
	<b>Acids</b>								
VOC	Acetic acid	64-19-7	4.35	2	< 5	1		1200	0.00
VOC	2-Ethylhexanoic acid	149-57-5	15.50	2	< 5	1	Repr. 1B	150	0.01

	Substance	CAS No.	RT [min]	Concentration+ calib. substances ≥ 1 µg/m³ uncalib. substances ≥ 1 µg/m³ DNPH ≥ 2 µg/m³ [µg/m³]	Toluene- equivalent substances ≥ 5 µg/m³ [µg/m³]	SER+ [µg/(m²·h)]	CMR Classifi- cation++	LCI AgBB 2021 [µg/m³]	R-value
	<b>Other identified substances in addition to LCI list</b>								
VOC	Glycol m/z 59*		13.57	5	5	2.5			
VOC	several not ident. substances*		17.6- 18.2	3	< 5	1.5			
VOC	Cluster isoalkanes, alkenes and/or other alcohols*	--	23.58	15	15	7.5		6000	0.00
SVOC	not identified SVOC Cluster*		25.2- 28.2	25	25	13			

+ identified and calibrated substances, substance specific calculated

++ classification according to Regulation (EG) N° 1272/2008: Categories Carc. 1A, 1B and 2, Muta. 1A, 1B and 2, Repr. 1A, 1B and 2, TRGS 905: K1A, K1B, K2, M1A, M1B, M2, R1A, R1B, R2; IARC: Group 1, 2A, 2B and 3, DFG MAK-list: Kategorie III1 to III5

\* unidentified substances, calculated as toluene equivalent reported with significant mass fragments as mass-to-charge ratio (m/z)

n. d.: not determined



Carcinogenic, mutagenic, and reproductive toxic compounds*	Concentration after 3 days [µg/m³]	SERa [µg/(m² · h)]
CMR 1: VOC (incl. VVOC and SVOC) with the following categorisations: Regulation (EC) No. 1272/2008: Category Carc. 1A and 1B, Muta. 1A and 1B, Repr. 1A and 1B; TRGS 905: K1A, K1B, M1A, M1B, R1A, R1B; IARC: Group 1 and 2A; DFG (MAK list): Categories III1, III2 (sum)	2	1
C 1: VOC (incl. VVOC and SVOC) with the following categorisations: Regulation (EG) Nr. 1272/2008: Category Carc. 1A u. 1B; TRGS 905: K1A, K1B (sum)	< 1	< 0.5

TVOC, Total volatile organic compounds	Concentration after 3 days [µg/m³]	SERa [µg/(m² · h)]
Sum of VOC according to DIN EN 16516	90	45
Sum of VOC according to AgBB 2021	110	57
Sum of VOC according to eco-INSTITUT-Label	130	65
Sum of VOC according to DIN ISO 16000-6	150	75

TSVOC, Total semi volatile organic compounds	Concentration after 3 days [µg/m³]	SERa [µg/(m² · h)]
Sum of SVOC according to DIN EN 16516	25	13
Sum of SVOC without LCI according to AgBB 2021	25	13
Sum of SVOC without LCI according to eco-INSTITUT-Label	25	13
Sum of SVOC with LCI according to AgBB 2021	< 5	< 2.5

TVVOC, Total very volatile organic compounds	Concentration after 3 days [µg/m³]	SERa [µg/(m² · h)]
Sum of VVOC according to AgBB 2021	< 5	< 2.5
Sum of VVOC according to eco-INSTITUT-Label	2	1

\*Excluding formaldehyde and acetaldehyde (Carc. 1B) due to an assumed "practical threshold" under which a significant carcinogenic risk is no longer to be expected (see Federal Institute for Risk Assessment (2006): Toxicological evaluation of formaldehyde and Federal Environment Agency (2016): Reference value for formaldehyde in indoor air and protocol of the 11th meeting of 'Ausschusses für Innenraumrichtwerte' (AIR), 11/2020). In the case of a toxicological emission assessment, a single-substance analysis of the concentrations is necessary.

In the opinion of the committee for Indoor Air Guide Values (Ausschuss für Innenraumrichtwerte) of the Federal Environment Agency, the concentration of 0.1 mg formaldehyde/m³ indoor air, based on a measurement period of half an hour, should not be exceeded, also for a short time (Bundesgesundheitsblatt 2016 · 59: 1040-1044 DOI 10.1007 / s00103 -016-2389-5 © Springer-Verlag Berlin Heidelberg 2016).

Other sums of VOC	Concentration after 3 days [µg/m³]	SERa [µg/(m² · h)]
VOC without LCI according to AgBB 2021 (sum)	5	2.5
VOC without LCI according to eco-INSTITUT-Label (sum)	8	4
CMR 2: VOC (incl. VVOC and SVOC) with the following categorisations: Regulation (EC) No. 1272/2008: Category Carc. 2, Muta. 2, Repr. 2; TRGS 905: K2, M2, R2; IARC: Group 2B; DFG (MAK list): Category III3 (sum)	< 1	< 0.5
Sensitising compounds with the following categorisations: DFG (MAK list): Category IV; Regulation (EC) No. 1272/2008: skin sensitising, respiratory sensitising; TRGS 907 (sum)	< 1	< 0.5
Bicyclic Terpenes (sum)	< 1	< 0.5
C9 - C14 Alkanes / Isoalkanes as dekane-equivalent (sum)	1	0.5
C4 - C11 Aldehydes, acyclic, aliphatic (sum)	< 2	< 1
C9 - C15 Alkylated benzenes (sum)	< 1	< 0.5
Cresols (sum)	< 1	< 0.5

Risk value for assessment of LCI	R-value
R-value according to eco-INSTITUT-Label	0.23
R-value according to AgBB 2021	0.20
R-value according to Belgian regulation	0.20
R-value according to EU-LCI	0.20

Note:

Due to different requirements in the respective guidelines, the calculation of TVOC, TVVOC, TSVOC and R-value may result in different values. Short-chain carbonyl compounds (C1-C5) are quantified via HPLC acc. to DIN ISO 16000-3:2013-01. Therefore, no toluene equivalents are given for VVOC. These substances are taken into concern by means of their substance specific calibration via the sum of VVOC acc. to DIN EN 16516:2020-10. For VOC however, the substance specific calibration takes place via HPLC whereas the TVOC is calculated using the toluene equivalent determined via Tenax acc. to DIN EN 16516:2020-10.

## 1.2 Sample A011, Volatile organic compounds after 28 days

### Test objective:

Volatile organic compounds (VOC), test chamber, air sampling 28 days after test chamber loading

### Test result:

Internal sample number: | 59213-A011

	Substance	CAS No.	RT [min]	Concentration+ calib. substances ≥ 1 µg/m³ uncalib. substances ≥ 1 µg/m³ DNPH ≥ 2 µg/m³ [µg/m³]	Toluene- equivalent substances ≥ 5 µg/m³ [µg/m³]	SER+ [µg/(m²·h)]	CMR Classifi- cation++	LCI AgBB 2021 [µg/m³]	R-value
	Other identified substances in addition to LCI list								
VOC	Cluster isoalkanes, alkenes and/or other alcohols*	--	23.58	2	< 5	1		6000	0.00

+ identified and calibrated substances, substance specific calculated

++ classification according to Regulation (EG) N° 1272/2008: Categories Carc. 1A, 1B and 2, Muta. 1A, 1B and 2, Repr. 1A, 1B and 2, TRGS 905: K1A, K1B, K2, M1A, M1B, M2, R1A, R1B, R2; IARC: Group 1, 2A, 2B and 3, DFG MAK-list: Kategorie III1 to III5

\* unidentified substances, calculated as toluene equivalent reported with significant mass fragments as mass-to-charge ratio (m/z)

n. d.: not determined

Carcinogenic, mutagenic, and reproductive toxic compounds*	Concentration after 28 days [µg/m³]	SERa [µg/(m² · h)]
CMR 1: VOC (incl. VVOC and SVOC) with the following categorisations: Regulation (EC) No. 1272/2008: Category Carc. 1A and 1B, Muta. 1A and 1B, Repr. 1A and 1B; TRGS 905: K1A, K1B, M1A, M1B, R1A, R1B; IARC: Group 1 and 2A; DFG (MAK list): Categories III1, III2 (sum)	< 1	< 0.5
C 1: VOC (incl. VVOC and SVOC) with the following categorisations: Regulation (EG) Nr. 1272/2008: Category Carc. 1A u. 1B; TRGS 905: K1A, K1B (sum)	< 1	< 0.5

TVOC, Total volatile organic compounds	Concentration after 28 days [µg/m³]	SERa [µg/(m² · h)]
Sum of VOC according to DIN EN 16516	< 5	< 2.5
Sum of VOC according to AgBB 2021	< 5	< 2.5
Sum of VOC according to eco-INSTITUT-Label	2	1
Sum of VOC according to DIN ISO 16000-6	3	1.5

TSVOC, Total semi volatile organic compounds	Concentration after 28 days [µg/m³]	SERa [µg/(m² · h)]
Sum of SVOC according to DIN EN 16516	< 5	< 2.5
Sum of SVOC without LCI according to AgBB 2021	< 5	< 2.5
Sum of SVOC without LCI according to eco-INSTITUT-Label	< 1	< 0.5
Sum of SVOC with LCI according to AgBB 2021	< 5	< 2.5

TVVOC, Total very volatile organic compounds	Concentration after 28 days [µg/m³]	SERa [µg/(m² · h)]
Sum of VVOC according to AgBB 2021	< 5	< 2.5
Sum of VVOC according to eco-INSTITUT-Label	< 1	< 0.5

\*Excluding formaldehyde and acetaldehyde (Carc. 1B) due to an assumed "practical threshold" under which a significant carcinogenic risk is no longer to be expected (see Federal Institute for Risk Assessment (2006): Toxicological evaluation of formaldehyde and Federal Environment Agency (2016): Reference value for formaldehyde in indoor air and protocol of the 11th meeting of 'Ausschusses für Innenraumrichtwerte' (AIR), 11/2020). In the case of a toxicological emission assessment, a single-substance analysis of the concentrations is necessary.

In the opinion of the committee for Indoor Air Guide Values (Ausschuss für Innenraumrichtwerte) of the Federal Environment Agency, the concentration of 0.1 mg formaldehyde/m³ indoor air, based on a measurement period of half an hour, should not be exceeded, also for a short time (Bundesgesundheitsblatt 2016 · 59: 1040-1044 DOI 10.1007 / s00103 -016-2389-5 © Springer-Verlag Berlin Heidelberg 2016).

Other sums of VOC	Concentration after 28 days [µg/m³]	SERa [µg/(m² · h)]
VOC without LCI according to AgBB 2021 (sum)	< 5	< 2.5
VOC without LCI according to eco-INSTITUT-Label (sum)	< 1	< 0.5
CMR 2: VOC (incl. VVOC and SVOC) with the following categorisations: Regulation (EC) No. 1272/2008: Category Carc. 2, Muta. 2, Repr. 2; TRGS 905: K2, M2, R2; IARC: Group 2B; DFG (MAK list): Category III3 (sum)	< 1	< 0.5
Sensitising compounds with the following categorisations: DFG (MAK list): Category IV; Regulation (EC) No. 1272/2008: skin sensitising, respiratory sensitising; TRGS 907 (sum)	< 1	< 0.5
Bicyclic Terpenes (sum)	< 1	< 0.5
C9 - C14 Alkanes / Isoalkanes as dekane-equivalent (sum)	< 1	< 0.5
C4 - C11 Aldehydes, acyclic, aliphatic (sum)	< 2	< 1
C9 - C15 Alkylated benzenes (sum)	< 1	< 0.5
Cresols (sum)	< 1	< 0.5

Risk value for assessment of LCI	R-value
R-value according to eco-INSTITUT-Label	0.00
R-value according to AgBB 2021	0.00
R-value according to Belgian regulation	0.00
R-value according to EU-LCI	0.00

Note:

Due to different requirements in the respective guidelines, the calculation of TVOC, TVVOC, TSVOC and R-value may result in different values. Short-chain carbonyl compounds (C1-C5) are quantified via HPLC acc. to DIN ISO 16000-3:2013-01. Therefore, no toluene equivalents are given for VVOC. These substances are taken into concern by means of their substance specific calibration via the sum of VVOC acc. to DIN EN 16516:2020-10. For VOC however, the substance specific calibration takes place via HPLC whereas the TVOC is calculated using the toluene equivalent determined via Tenax acc. to DIN EN 16516:2020-10.

Cologne, 20/08/2024



Michael Stein, Dipl.-Chem.  
(Laboratory Management)

## Appendix

### Sampling sheet



#### Sampling Sheet

Please fill in all fields. If the fields marked \* are not filled in, the test piece cannot be accepted for laboratory testing.

Please take one sampling sheet for each sample! The sampling instruction must be strictly maintained!

59213-011

Order by*	Kerakoll Spa via Pedemontana, 25 41049 Sassuolo (MO) ITALY	Testing laboratory	eco-INSTITUT Germany GmbH Schanzenstr. 6-20, Carlswerk 1.19 D - 51063 Köln Tel. +49 (0)221 - 931245-0 Fax +49 (0)221 - 931245-33
<input type="checkbox"/> Name of production company	Kerakoll SpA	Sampling by* (name, company, phone)	Alberto Spaggiari +39 0536 816610
<input type="checkbox"/> Name of distribution (if different from production)		Sampling location*	Wharehouse
Name of test sample/ item*	Universal Wall Primer	Product type (e.g. parquet, floor covering)	
Article number		Sample/ Batch*	K41124107
Model / Program / Series		Production date of batch*	12/05/2024
Sample taken from <input type="checkbox"/> current production <input checked="" type="checkbox"/> storage <input type="checkbox"/> other		Sampling date*	30/05/2024
Storage location		Storage conditions before sampling <input type="checkbox"/> open <input checked="" type="checkbox"/> packaged	
Packaging material			
Additional information, if applicable / Special issues Uncertainties, questions, possible negative effects through emissions at place of sampling - e.g. contaminations during production/storage			

#### Validation\*

By signing the accuracy of the above-mentioned statements (sampling) is affirmed.

Date  
(dd/mm/yyyy)

31/05/2024

Signature Alberto Spaggiari

eco-INSTITUT Germany GmbH / Schanzenstrasse 6-20 / Carlswerk 1.19 / D-51063 Köln / Germany  
Tel. +49 221.931245-0 / Fax +49 221.931245-33 / eco-institut.de / Geschäftsführer: Dr. Frank Kuebart, Daniel Tigges  
HRB 17917 / USt-ID: DE 122653302 / Volksbank Rhein-Erft-Köln eG, IBAN: DE60370623651701900010, BIC: GENODE33HAN

## List of calibrated Volatile Organic Compounds (VOC)

### Aromatic hydrocarbons (31)

Benzene<sup>4</sup>  
 1,2,3-Trimethylbenzene  
 1,2,4-Trimethylbenzene  
 1,3,5-Trimethylbenzene  
 1-Isopropyl-2-methylbenzene  
 1-Isopropyl-4-methylbenzene  
 1,2,4,5-Tetramethylbenzene  
 Ethylbenzene  
 n-Propylbenzene  
 Isopropylbenzene (Cumene)<sup>4</sup>  
 1,3-Diisopropylbenzene  
 1,4-Diisopropylbenzene  
 n-Butylbenzene  
 1-Propenylbenzene (beta-Methylstyrene)  
 Toluene  
 2-Ethyltoluene  
 Vinyltoluene  
 o-Xylene  
 m-/p-Xylene  
 Styrene  
 Phenylacetylene  
 2-Phenylpropene (alpha-Methylstyrene)  
 4-Phenylcyclohexene  
 1-Phenylcyclohexene  
 1-Phenyldecane<sup>2</sup>  
 1-Phenylundecane<sup>2</sup>  
 Indene  
 Naphthalene  
 1-Methylnaphthalene  
 2-Methylnaphthalene  
 1,4-Dimethylnaphthalene

### Aliphatic hydrocarbons (23)

2-Methylpentane<sup>1</sup>  
 3-Methylpentane<sup>1</sup>  
 Methylcyclopentane  
 n-Hexane  
 Cyclohexane  
 Methylcyclohexane  
 1,4-Dimethylcyclohexane  
 n-Heptane  
 2,2,4,4,6,6-Pentamethylheptane  
 n-Octane  
 n-Nonane  
 n-Decane  
 n-Undecane  
 n-Dodecane  
 n-Tridecane  
 n-Tetradecane  
 n-Pentadecane  
 n-Hexadecane  
 Decahydronaphthalene  
 1-Octene  
 1-Decene  
 1-Dodecene  
 4-Vinylcyclohexene

### Terpenes (12)

delta-3-Carene  
 alpha-Pinene  
 beta-Pinene  
 alpha-Terpinene  
 Longipinene  
 Limonene  
 Longifolene  
 Isolongifolene  
 beta-Caryophyllene  
 alpha-Phellandrene  
 Myrcene  
 Camphene

### Aliphatic alcohols and ether (18)

Ethanol<sup>1</sup>  
 1-Propanol<sup>1</sup>  
 2-Propanol<sup>1</sup>  
 2-Methyl-1-propanol  
 1-Butanol  
 tert-Butanol  
 1-Pentanol  
 1-Hexanol  
 Cyclohexanol  
 2-Ethyl-1-hexanol  
 1-Heptanol  
 1-Octanol  
 1-Nonanol  
 1-Decanol  
 1,4-Cyclohexandimethanol  
 4-Hydroxy-4-methyl-pentan-2-one  
 (Diacetone alcohol)  
 Methyl-tert-butyl ether (MTBE)<sup>1</sup>  
 Tetrahydrofuran (THF)

### Aromatic alcohols (phenoles) (8)

Furfuryl alcohol  
 Benzyl alcohol  
 Phenol  
 2-Phenylphenol (oPP)  
 BHT (2,6-Di-tert-butyl-4-methylphenol)  
 o-Cresol  
 m-/p-Cresol  
 4-Chloro-3-methylphenol (Chlorocresol)

### Glycols, Glycol ether, Glycol ester (49)

Ethyleneglycol (Ethan-1,2-diol)  
 Propylenglycol (Propane-1,2-diol)  
 Diethylene glycol  
 Dipropylene glycol  
 Neopentyl glycol  
 Hexyleneglycol  
 Ethyldiglycol  
 Ethylene glycol monobutyl ether  
 Diethylene glycol methyl ether  
 Diethylene glycol monobutyl ether  
 Diethylene glycol phenyl ether  
 Dipropylene glycol-dimethyl ether

Dipropylene glycol mono-n-butyl ether  
 Dipropylene glycol mono-tert-butyl ether  
 Dipropylene glycol monomethyl ether  
 Dipropylene glycol mono-n-propyl ether  
 Tripropylene glycol monomethyl ether  
 Triethylene glycol dimethyl ether  
 1,2-Propylene glycol dimethyl ether  
 1,2-Propylene glycol-n-propyl ether  
 1,2-Propylene glycol-n-butyl ether  
 Butyl glycolate  
 2-Methoxyethanol  
 2-Ethoxyethanol  
 2-Methylethoxyethanol  
 2-Propoxyethanol  
 2-Hexoxyethanol  
 2-(2-Hexoxyethoxy)ethanol  
 2-Phenoxyethanol  
 1-Methoxy-2-propanol  
 2-Methoxy-1-propanol  
 1-Ethoxy-2-propanol  
 1-tert-Butoxy-2-propanol  
 3-Methoxy-1-butanol  
 1,4-Butanediol  
 1,2-Dimethoxyethane  
 1,2-Diethoxyethane  
 1-Methoxy-2-(2-methoxy-ethoxy)ethane  
 Ethylene carbonate  
 Propylene carbonate  
 2-Methoxy-1-propyl acetate  
 Diethylene glycol monomethyl ether acetate  
 2-Methoxyethyl acetate  
 2-Ethoxyethyl acetate  
 2-Butoxy ethyl acetate  
 Dipropylene glycol monomethyl ether acetate  
 Propylene glycol diacetate  
 Texanol  
 TXIB (Texanol isobutyrate)

### Aldehydes (26)

Formaldehyde<sup>1,3,4</sup>  
 Acetaldehyde<sup>1,3,4</sup>  
 Propanal<sup>1,3</sup>  
 Butanal<sup>1,3</sup>  
 3-Methyl-1-butanal  
 Pentanal  
 Hexanal  
 2-Ethylhexanal  
 Heptanal  
 Octanal  
 Nonanal  
 Decanal  
 Propenal (Acrolein)<sup>1</sup>  
 Isobutanal (Methacrolein)<sup>3</sup>  
 2-Butenal  
 2-Pentenal<sup>3</sup>  
 2-Hexenal  
 2-Heptenal  
 2-Octenal

2-Nonenal  
 2-Decenal  
 2-Undecenal  
 Ethanedial (Glyoxal)<sup>1,3</sup>  
 Glutaraldehyde  
 Furfural  
 Benzaldehyde

#### Ketones (15)

Acetone<sup>1,3</sup>  
 1-Hydroxyacetone  
 Ethylmethylketone<sup>3</sup>  
 Methylisobutylketone  
 3-Methyl-2-butanone  
 Cyclopentanone  
 2-Methylcyclopentanone  
 Cyclohexanone  
 2-Methylcyclohexanone  
 2-Hexanone  
 2-Heptanone  
 Acetophenone  
 Isophorone  
 Benzophenone<sup>4</sup>  
 4-Methylbenzophenone<sup>2</sup>

#### Acids (11)

Acetic acid  
 Propionic acid  
 Pivalic acid  
 Butyric acid  
 Isobutyric acid  
 n-Valeric acid  
 n-Caproic acid  
 2-Ethylhexanoic acid  
 n-Heptanoic acid  
 n-Octanoic acid  
 Neodecanoic acid

#### Esters and Lactones (33)

Methyl acetate<sup>1</sup>  
 Ethyl acetate<sup>1</sup>  
 Vinyl acetate<sup>1</sup>  
 Propyl acetate  
 Isopropyl acetate  
 2-Methoxy-1-methylethyl acetate  
 n-Butyl acetate  
 Isobutylacetate  
 2-Ethylhexyl acetate  
 n-Butyl formate

Methyl acrylate  
 Methyl methacrylate  
 Butyl methacrylate  
 Ethyl acrylate  
 n-Butyl acrylate  
 2-Ethylhexyl acrylate  
 2-Ethylhexyl methacrylate  
 Hexanediol diacrylate  
 Dipropylene glycol diacrylate  
 Dimethyl succinate  
 Dimethyl glutarate  
 Dimethyl adipate  
 Dibutyl fumarate  
 Dibutyl maleate  
 Diisobutyl succinate  
 Diisobutyl glutarate  
 Butyrolactone  
 Dimethyl phthalate  
 Diethyl phthalate<sup>2</sup>  
 Dipropyl phthalate<sup>2</sup>  
 Dibutyl phthalate<sup>2</sup>  
 Diisobutyl phthalate<sup>2</sup>  
 (5-Ethyl-1,3-dioxan-5-yl)methyl acrylate

#### Chlorinated hydrocarbons (18)

Dichloromethane<sup>1</sup>  
 Trichloromethane (Chloroform)<sup>4</sup>  
 Tetrachloromethane  
 1,2-Dichloroethane<sup>4</sup>  
 1,1,1-Trichloroethane  
 2-Chloropropane  
 1,2,3-Trichloropropane<sup>4</sup>  
 Trichloroethene<sup>4</sup>  
 Tetrachloroethene  
 trans-1,3-Dichloropropene<sup>4</sup>  
 cis-1,3-Dichloropropene<sup>4</sup>  
 Chloroprene<sup>4</sup>  
 1,3-Dichloro-2-propanol<sup>4</sup>  
 Chlorobenzene  
 1,4-Dichlorobenzene  
 alpha-Chlorotoluene<sup>4</sup>  
 alpha,alpha,alpha-Trichlorotoluene<sup>4</sup>  
 1,1-Dichloroethene<sup>1</sup>

#### Cyclic siloxanes (5)

Hexamethylcyclotrisiloxane (D3)  
 Octamethylcyclotetrasiloxane (D4)  
 Decamethylcyclopentasiloxane (D5)  
 Dodecamethylcyclohexasiloxane (D6)  
 Tetradecamethylcycloheptasiloxane (D7)

#### Others (42)

1,4-Dioxane<sup>4</sup>  
 1,2-Dibromoethane<sup>4</sup>  
 2-Nitropropane<sup>4</sup>  
 2,3-Dinitrotoluene<sup>4</sup>  
 2,4-Dinitrotoluene<sup>4</sup>  
 2,6-Dinitrotoluene<sup>4</sup>  
 3,4-Dinitrotoluene<sup>2,4</sup>  
 o-Anisidine<sup>4</sup>  
 o-Toluidine<sup>4</sup>  
 4-Chloro-o-toluidine<sup>4</sup>  
 5-Nitro-o-toluidine<sup>2</sup>  
 Acrylonitrile<sup>1,4</sup>  
 2,2'-Azobisisobutyronitrile  
 Tetramethylsuccinonitrile  
 Azobenzene<sup>2,4</sup>  
 Caprolactam  
 Furan<sup>1,4</sup>  
 2-Methylfuran  
 2-Pentylfuran  
 Methenamine  
 Triethylamine  
 2-Butanoneoxime<sup>4</sup>  
 Triethyl phosphate  
 Tributyl phosphate<sup>2</sup>  
 5-Chloro-2-methyl-4-isothiazolin-3-one (CIT)  
 2-Methyl-4-isothiazolin-3-one (MIT)  
 2-n-Octyl-4-isothiazolin-3-one (OIT)  
 Formamide  
 Dimethylformamide (DMF)  
 Acetamide  
 N-Nitrosopyrrolidine<sup>4</sup>  
 N-Methyl-2-pyrrolidone  
 N-Ethyl-2-pyrrolidone  
 N-Butyl-2-pyrrolidone  
 Aniline<sup>5</sup>  
 4-Chloroaniline<sup>4</sup>  
 2-Nitroanisole<sup>4</sup>  
 Cyclohexyl isocyanate  
 p-Cresidine<sup>4</sup>  
 Diethyl sulfate<sup>4</sup>  
 Epichlorohydrin<sup>4</sup>  
 5-Ethyl-1,3-dioxan-5-methanol

- 1 VVOC
- 2 SVOC
- 3 Analysis acc. to DIN ISO 16000-3:2023-12 (DNPH)
- 4 Carcinogens, category 1A and 1B according to Regulation (EC) No 1272/2008 and TRGS 905
- 5 When analysing with TD-GC-MS, aniline can occur as a thermal decomposition product of other substances (e.g. 1,3-Diphenylguanidine).  
 A cold analytical method is recommended to confirm the result.

(Status: August 2024)



## Definition of terms

CAS No. (Chemical Abstracts Service)	International designation standard for chemical substances
CMR	VOCs, VVOCs and SVOCs classified as carcinogenic, mutagenic or toxic for reproduction according to Regulation (EC) No. 1272/2008, TRGS 905, IARC list and DFG (MAK list)
Limit of quantification (LOQ)	Lower limit of quantification in the analytical method within the defined measurement uncertainty
NIK / LCI	Lowest concentration of interest; substance-specific value for health assessment of emissions from products, indicated in $\mu\text{g}/\text{m}^3$
RT (retention time)	Total time required for an analyte to pass the column (time between injection and detection of the analyte)
R value	Sum of quotients of concentration and LCI value for all substances for which a LCI value is derived
R value according to AgBB	R-value for all substances $\geq 5 \mu\text{g}/\text{m}^3$ with LCI value, calculated according to the LCI list of the AgBB scheme
R-value according to Belgian regulation	R-value for all substances $\geq 5 \mu\text{g}/\text{m}^3$ with LCI-value, calculated according to the LCI-list of the Belgian regulation
R value according to eco-INSTITUT-Label	R-value for all substances $\geq 1 \mu\text{g}/\text{m}^3$ with LCI value, calculated according to the LCI list of the AgBB scheme
R value according to EU-LCI	R-value for all substances $\geq 5 \mu\text{g}/\text{m}^3$ with EU-LCI value, calculated according to the EU-LCI list of the European Commission
SER	Specific emission rate (see "Explanation of Specific Emission Rate SER")
SVOC (semi volatile organic compound)	Organic compound eluting in the retention range $> C_{16}$ (n-hexadecane) to $C_{22}$ (docosane)
Toluene equivalent	Concentration of a substance quantified by the TIC response factor of toluene (calculation of the concentration by comparing the integral of the substance with the integral of toluene)
TSVOC	Sum of the concentrations of all identified and unidentified semi volatile organic compounds eluting in the retention range $> C_{16}$ (n-hexadecane) to $C_{22}$ (docosane)
TSVOC according to DIN EN 16516	Sum of all SVOC $\geq 5 \mu\text{g}/\text{m}^3$ (as toluene equivalent)
TSVOC with LCI according to AgBB	Sum of all SVOC with LCI $\geq 5 \mu\text{g}/\text{m}^3$ (quantified substance-specific)
TSVOC with LCI according to eco-INSTITUT-Label	Sum of all SVOC with LCI $\geq 1 \mu\text{g}/\text{m}^3$ (quantified substance-specific)
TSVOC without LCI according to AgBB	Sum of all SVOC without LCI $\geq 5 \mu\text{g}/\text{m}^3$ (as toluene equivalent)
TSVOC without LCI according to eco-INSTITUT label	Sum of all calibrated SVOC without LCI $\geq 1 \mu\text{g}/\text{m}^3$ (quantified substance-specific) and all non-calibrated SVOC without LCI $\geq 1 \mu\text{g}/\text{m}^3$ (as toluene equivalent)
TVOC	Sum of the concentrations of all identified and unidentified volatile organic compounds eluting in the retention range from $C_6$ (n-hexane) to $C_{16}$ (n-hexadecane)

TVOC according to DIN EN 16516	Sum of all VOC $\geq 5 \mu\text{g}/\text{m}^3$ in the retention range $C_6$ to $C_{16}$ , calculated as toluene equivalent (used i.a. for M1)
TVOC according to AgBB	Sum of all VOCs with LCI $\geq 5 \mu\text{g}/\text{m}^3$ (quantified substance-specific) and all VOCs without LCI $\geq 5 \mu\text{g}/\text{m}^3$ (as toluene equivalent) (used i.a. for the Blue Angel)
TVOC according to eco-INSTITUT-Label	Sum of all calibrated VOC $\geq 1 \mu\text{g}/\text{m}^3$ (quantified substance-specific) and all non-calibrated VOC $\geq 1 \mu\text{g}/\text{m}^3$ (as toluene equivalent) (used i.a. for natureplus)
TVOC according to ISO 16000-6	Total area of the chromatogram in the retention range $C_6 - C_{16}$ as toluene equivalent according to DIN ISO 16000-6, Annex A.1 item 3 (used i.a. for CDPH, BIFMA and the French VOC regulation)
TVOC without LCI according to AgBB	Sum of all VOCs without LCI $\geq 5 \mu\text{g}/\text{m}^3$ as toluene equivalent
TVOC without LCI according to eco-INSTITUT-Label	Sum of all calibrated VOCs without LCI $\geq 1 \mu\text{g}/\text{m}^3$ (quantified substance-specific) and all non-calibrated VOCs without LCI $\geq 1 \mu\text{g}/\text{m}^3$ (as toluene equivalent)
TVVOC	Sum of the concentrations of all identified and unidentified very volatile organic compounds eluting in the retention range $< C_6$ (n-hexane)
TVVOC according to AgBB	Sum of all VVOC with LCI $\geq 5 \mu\text{g}/\text{m}^3$ (quantified substance-specific) and all VVOC without LCI $\geq 5 \mu\text{g}/\text{m}^3$ (as toluene equivalent)
TVVOC according to eco-INSTITUT-Label	Sum of all calibrated VVOC $\geq 1 \mu\text{g}/\text{m}^3$ (substance-specific quantified) and all non-calibrated VVOC $\geq 1 \mu\text{g}/\text{m}^3$ (as toluene equivalent)
VOC (volatile organic compound)	Organic compound eluting in the retention range from $C_6$ (n-hexane) to $C_{16}$ (n-hexadecane)
VVOC (very volatile organic compound)	Organic compound eluting in the retention range $< C_6$ (n-hexane)

## Commentary on emission analysis

### Test method

Measurement of the volatile organic compounds takes place in the test chamber in conditions similar to those applying in practice. Standardised test conditions are defined for the test chamber regarding loading, air exchange, relative humidity, temperature, and incoming air, based on the type of test specimen and the required guideline. These conditions and the underlying standards are to be found in the section on test methods in the laboratory report.

Air samples are taken from the test chamber at defined points in time during the continuously running test. To this end, approximately 5 L of air are collected from the test chamber at an air flow rate of 100 mL/min on Tenax and approx. 100 L at an air flow rate of 0.8 L/min on silica gel coated with DNPH (2,4-dinitrophenylhydrazine).

After thermal desorption, the substances adsorbed on Tenax are analysed using gas chromatographic separation and mass spectrometric determination. The gas chromatographic separation is performed with a slightly polar capillary column of 60 m in length.

The substances derivatised with DNPH for the determination of formaldehyde and other short-chain carbonyl compounds ( $C_1 - C_6$ ) are analysed using high-performance liquid chromatography (HPLC).

Over 200 compounds, including volatile organic compounds ( $C_6 - C_{16}$ ), semi-volatile organic compounds ( $C_{16} - C_{22}$ ) and – insofar as possible with this method – also very volatile organic compounds (less than  $C_6$ ) are determined and quantified individually.

All other substances – insofar as possible – are identified through comparison with a library of spectra. The quantification of these substances and non-identified substances is performed through a comparison of their signal area with the signal of toluene.

The determined substance concentrations are corrected using the recovery rate of the internal standard (toluene-d8). Identification and quantification of substances is carried out from a concentration (limit of quantification) of 1 µg per m<sup>3</sup> test chamber air or 2 µg/m<sup>3</sup> for DNPH-derivatised substances. In the case of highly loaded samples, the evaluation limit of non-calibrated substances is raised in some cases, as it is no longer possible to assign individual, small signals due to the large number of signals.

### Quality assurance

The eco-INSTITUT Germany GmbH is granted flexible scope of accreditation pursuant to DIN EN ISO/IEC 17025:2018-03. The accreditation covers the analytical determination of all volatile organic compounds, including the test chamber method.

In each analysis the analytical system is checked using an external standard based on the specifications in standard DIN EN 16516:2020-10. The stability of the analytical systems is documented based on the test standard using control charts.

Laboratory performance is assessed at least once a year in inter-laboratory comparisons by comparing the results with those obtained by other laboratories for identical samples.

A blank is run prior to introducing the test specimen into the test chamber to check for the possible presence of volatile organic compounds.

The expanded measurement uncertainty U for the analytical determination of all volatile organic compounds, including the test chamber method, is estimated to 41.7 %. The calculation is based on DIN ISO 11352:2013-03 (Nordtest).

## Explanation of Specific Emission Rate SER

Emission measurements are accomplished in test chambers under defined physical conditions (temperature, relative humidity, room loading, air change rate etc.).

Test chamber measurement results are directly comparable only if the investigations were accomplished under the same basic conditions.

If the differences of the physical conditions refer only to the change of air rate and/or the loading, the "SER" or "specific emission rate" can be used for comparability of the measurement results. The SER indicates how many volatile organic compounds (VOC) are released by the sample for each material unit and hour (h).

The SER can be calculated using the formula below for each proven individual component of the VOC from the data in the test report.

As material units the following are applicable:

l = unit of length (m)	relation between emission and length
a = unit area (m <sup>2</sup> )	relation between emission and surface
v = unit volume (m <sup>3</sup> )	relation between emission and volume
u = piece unit (unit = piece)	relation between emission and complete unit

From this the different dimensions for SER result:

length-specific	SER <sub>l</sub>	in µg/(m·h)
surface-specific	SER <sub>a</sub>	in µg/(m <sup>2</sup> ·h)
volume-specific	SER <sub>v</sub>	in µg/(m <sup>3</sup> ·h)
unit-specific	SER <sub>u</sub>	in µg/(u·h)

SER thus represents a product specific rate, which describes the mass of the volatile organic compound, which is emitted by the product per time unit at a certain time after beginning of the examination.

$$SER = q \cdot c$$

- q      specific air flow rate (quotient from change of air rate and loading)  
c      concentration of the measured substance(s)

The result can be indicated in milligrams (mg) in place of micro grams (µg), whereby 1 mg = 1000 µg.