

ADLER-Werk Lackfabrik Johann Berghofer GmbH & Co KG  
Bergwerkstraße 22  
6130 SCHWAZ  
Österreich

## Test Report No. 59568-A001-AgBB-L

Test objective:	Evaluation according to AgBB scheme 2024
Article designation according to order:	Lignovit Plus LB
Date of report:	06/12/2024
Number of pages of report:	19
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 <a href="http://www.eco-institut.de/en/advertising">www.eco-institut.de/en/advertising</a>



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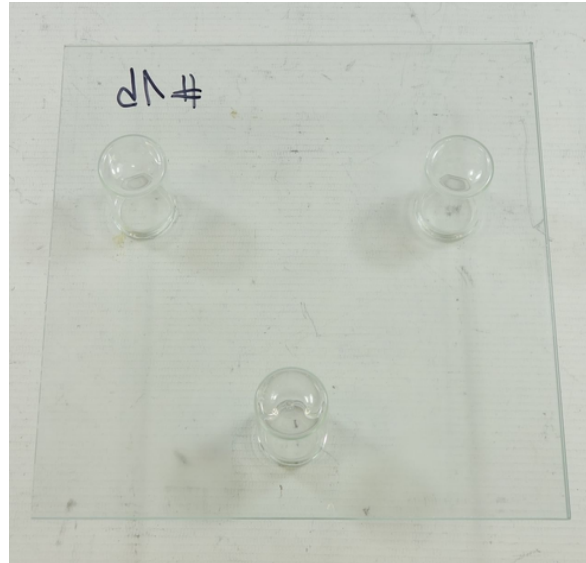
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## Sample View

Internal sample number (filled in by laboratory)

59568-A001

Photo of the test specimen: A001



Article designation according to order:  
Sample/batch number according to order:  
Type of sample:  
Date of production:  
Sampling by:  
Date of sampling:  
Location of sampling:  
Receipt of sample / Condition upon delivery:

Lignovit Plus LB  
#417032  
2 identically coated glass plates to 20 cm x 20 cm (#1a und #1b)  
03.09.2024  
Peter Passler, M.Sc.  
07/10/2024  
Labor Entwicklung Fenster- und Bautenlacke  
14/10/2024 / Sample is not packed separately from A002, test specimen labelled



## Statement of conformity with AgBB 2024

The sample with the internal sample number 59568-A001 has been tested on behalf of **ADLER-Werk Lackfabrik Johann Berghofer GmbH & Co KG**. The article description according to the order is **Lignovit Plus LB**.

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 2024).

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>	0.15 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>	0.039 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)	0.01	≤ 1	yes
Sum VOC without LCI	0.025 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 2024

The sample with the internal sample number 59568-A001, article description according to order: **Lignovit Plus LB**, meets the emission requirements of the AgBB scheme.

Cologne, 06/12/2024

A handwritten signature in black ink, appearing to read 'N. Rasch'.

Nora Rasch,  
(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

### A001, Preparation of test specimen

Date:

09/10/2024

Test specimen preparation:

Applied by the customer: Application on glass with a cup gun on 09/10/2024, Application quantity: 100 g/m<sup>2</sup>; drying / pre-conditioning for 24 hours, subsequently packed; Shipping on 10/10/2024; Sample receipt Laboratory on 14/10/2024

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:

20.0 cm x 20.0 cm

### A001, Test chamber conditions according to DIN EN ISO 16000-9:2024-08

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:

0.4 m<sup>2</sup>/m<sup>3</sup>

Specific air flow rate:

1.25 m<sup>3</sup>/(m<sup>2</sup>·h)

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

15/10/2024

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 A001, 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: | 59568-A001

	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 2024 [µg/m³]	R-value
	<b>Glycols, Glycol ethers, Glycol esters</b>								
VOC	2,2,4-Trimethyl-1,3-pentanediol monoisobutyrate (Texanol®)	25265-77-4	22.04	68	45	85		850	0.08
VOC	2,2,4-Trimethyl-1,3-pentanediol diisobutyrate (TXIB)	6846-50-0	25.35	2	< 5	2.5		1300	0.00
	<b>Aldehydes</b>								
VOC	Hexanal	66-25-1	8.78	3	< 5	3.8		900	0.00
VVOC	Acetaldehyde	75-07-0		3	n. d.	3.8	Carc. 1B Muta. 2	300	0.01
VVOC	Formaldehyde	50-00-0		2	n. d.	< 2.9	Carc. 1B Muta. 2	100	0.02
	<b>Ketones</b>								
VOC	Methylisobutylketone	108-10-1	7.42	4	< 5	5	Carc. 2	1000	0.00
	<b>Other identified substances in addition to LCI list</b>								
VOC	Hexamethylcyclotrisiloxane (D3)	541-05-9	8.82	1	< 5	1.3			
VOC	m/z 91 61 75*		5.82	2	< 5	2.5			
VOC	m/z 69 43 111*		10.05	3	< 5	3.8			
VOC	Glycol probably Surfynol m/z 43 109 151*		22.37	78	78	98			

+ 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)	< 1	< 1.3
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	< 1.3

TVOC, Total volatile organic compounds	Concentration after 3 days [µg/m³]	SERa [µg/(m² · h)]
Sum of VOC according to DIN EN 16516	120	150
Sum of VOC according to AgBB 2024	150	180
Sum of VOC according to eco-INSTITUT-Label	160	200
Sum of VOC according to DIN ISO 16000-6	140	180

TSVOC, Total semi volatile organic compounds	Concentration after 3 days [µg/m³]	SERa [µg/(m² · h)]
Sum of SVOC according to DIN EN 16516	< 5	< 6.3
Sum of SVOC without LCI according to AgBB 2024	< 5	< 6.3
Sum of SVOC without LCI according to eco-INSTITUT-Label	< 1	< 1.3
Sum of SVOC with LCI according to AgBB 2024	< 5	< 6.3

TVVOC, Total very volatile organic compounds	Concentration after 3 days [µg/m³]	SERa [µg/(m² · h)]
Sum of VVOC according to AgBB 2024	< 5	< 6.3
Sum of VVOC according to eco-INSTITUT-Label	5	6.3

\*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 2024 (sum)	78	98
VOC without LCI according to eco-INSTITUT-Label (sum)	84	110
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)	9	11
Sensitising compounds with the following categorisations: DFG (MAK list): Category IV; Regulation (EC) No. 1272/2008: skin sensitising, respiratory sensitising; TRGS 907 (sum)	2	2.5
Bicyclic Terpenes (sum)	< 1	< 1.3
C9 - C14 Alkanes / Isoalkanes as dekane-equivalent (sum)	< 1	< 1.3
C4 - C11 Aldehydes, acyclic, aliphatic (sum)	3	3.8
C9 - C15 Alkylated benzenes (sum)	< 1	< 1.3
Cresols (sum)	< 1	< 1.3

Risk value for assessment of LCI	R-value
R-value according to eco-INSTITUT-Label	0.12
R-value according to AgBB 2024	0.08
R-value according to Belgian regulation	0.08
R-value according to EU-LCI	0.08

## 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 A001, 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: | 59568-A001

	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 2024 [µg/m³]	R-value
	<b>Aliphatic mono alcohols (n-, iso-, cyclo-) and dialcohols</b>								
VVOC	Ethanol	64-17-5	3.44	1	< 5	1.3	III5		
	<b>Ketones</b>								
VOC	Methylisobutylketone	108-10-1	7.41	14	8	18	Carc. 2	1000	0.01
	<b>Other identified substances in addition to LCI list</b>								
VOC	m/z 69 43 111*		10.05	5	5	6.3			
VOC	Glycol probably Surfynol m/z 43 109 151*		22.37	20	20	25			

+ 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	< 1.3
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	< 1.3

TVOC, Total volatile organic compounds	Concentration after 28 days [µg/m³]	SERa [µg/(m² · h)]
Sum of VOC according to DIN EN 16516	33	41
Sum of VOC according to AgBB 2024	39	49
Sum of VOC according to eco-INSTITUT-Label	39	49
Sum of VOC according to DIN ISO 16000-6	17	21

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	< 6.3
Sum of SVOC without LCI according to AgBB 2024	< 5	< 6.3
Sum of SVOC without LCI according to eco-INSTITUT-Label	< 1	< 1.3
Sum of SVOC with LCI according to AgBB 2024	< 5	< 6.3

TVVOC, Total very volatile organic compounds	Concentration after 28 days [µg/m³]	SERa [µg/(m² · h)]
Sum of VVOC according to AgBB 2024	< 5	< 6.3
Sum of VVOC according to eco-INSTITUT-Label	1	< 1.3

\*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 2024 (sum)	25	31
VOC without LCI according to eco-INSTITUT-Label (sum)	25	31
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)	14	18
Sensitising compounds with the following categorisations: DFG (MAK list): Category IV; Regulation (EC) No. 1272/2008: skin sensitising, respiratory sensitising; TRGS 907 (sum)	< 1	< 1.3
Bicyclic Terpenes (sum)	< 1	< 1.3
C9 - C14 Alkanes / Isoalkanes as dekane-equivalent (sum)	< 1	< 1.3
C4 - C11 Aldehydes, acyclic, aliphatic (sum)	< 2	< 2.9
C9 - C15 Alkylated benzenes (sum)	< 1	< 1.3
Cresols (sum)	< 1	< 1.3

Risk value for assessment of LCI	R-value
R-value according to eco-INSTITUT-Label	0.01
R-value according to AgBB 2024	0.01
R-value according to Belgian regulation	0.01
R-value according to EU-LCI	0.01

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, 06/12/2024

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



# Appendix

## Sampling sheet



### Probenahmebegleitblatt

Bitte möglichst alle Felder ausfüllen. Sind die mit einem \* gekennzeichneten Felder nicht ausgefüllt, können die Prüfstücke nicht zur Laborprüfung angenommen werden.

# 59568-001

Bitte pro Probe ein Probenahmebegleitblatt ausfüllen! Die Probenahmeanleitung ist unbedingt einzuhalten!

**Auftrag erteilt durch\*** ADLER-Werk Lackfabrik Johann Berghofer GmbH & Co KG  
Bergwerkstraße 22, A-6130 Schwaz

**Prüflabor** 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

**Name des Herstellerbetriebes**

**Probenahme durch\*** Peter Passler, M.Sc.  
(Name, Firma, Telefon) +43 / 5242 6922 731

**Name des Vertriebs**  
(wenn abweichend vom Herstellerbetrieb)

**Probenahmeort\*** Labor Entwicklung Fenster- und Bautenlacke

**Prüfstück-/ Artikelbezeichnung\*** Lignovit Plus LB

**Probenart** 2 identisch beschichtete Glasplatten zu je 20cm x 20cm  
(z.B. Holzwerkstoff, Bodenbelag)  
Bezeichnung: #1a und #1b

**Artikel-Nr.** 53219

**Proben-/ Chargen-Nr.\*** #416969 # 417032

**Modell / Programm / Serie** Wasserbasierte Mittelschichtlasur für Nadelholz für Industrie und Gewerbe

**Produktionsdatum der Charge\*** 18.10.2024 03.09.2024

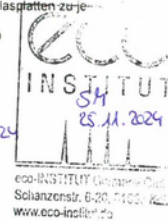
**Probe entnommen aus**  
 Fertigung  
 Lager  
 Sonstiges

**Datum der Probenahme\*** 07.10.2024

**Lagerung vor der Probenahme**  
 offen  
 verpackt

**Lagerort** Qualitätssicherung

**Verpackungsmaterial** Blechdose



**ggf. zusätzliche Angaben / Besonderheiten zur Probenahme /**  
Unklarheiten, Fragen, mögliche negative Einflüsse durch Emissionen am Probenahmeort - z.B. Kontaminationen während der Produktion/Lagerung

**Bestätigung\***  
Hiermit wird durch die Unterzeichnung (**Probenahme**) die Richtigkeit der oben gemachten Angaben bestätigt

**Datum** 10/10/2024  
(dd/mm/yyyy)

**Unterschrift**

**ADLER-WERK  
LACKFABRIK**  
Johann Berghofer GmbH & Co KG  
A-6130 Schwaz - Bergwerkstr. 22

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 122653308 / Volksbank Rhein-Erft-Köln eG, IBAN: DE60370623551701900010, 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-Phenylcyclohexane  
 1-Phenyldecanol  
 1-Phenylundecane<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-Dichlorethene<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-Butanoxime<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<sub>1</sub> - C<sub>6</sub>) are analysed using high-performance liquid chromatography (HPLC).

Over 200 compounds, including volatile organic compounds (C<sub>6</sub> - C<sub>16</sub>), semi-volatile organic compounds (C<sub>16</sub> - C<sub>22</sub>) and – insofar as possible with this method – also very volatile organic compounds (less than C<sub>6</sub>) 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.

$$\text{SER} = q \cdot c$$

- 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.