

DORMA Hüppe Raumtrennsysteme GmbH
Industriestr. 5
26655 Ocholt
Deutschland

Test Report No. 56596-A001-A003-AgBB-L II

Test objective:	Evaluation according to AgBB-scheme 2021
Article designation according to order:	Variflex komplette mobile Trennwand mit HPL-Oberfläche, (Vollwandelement, Durchgangstür, Teleskelement, Rollen/Abhängungen)
Sample/batch according to order:	individually manufactured
Sampling by:	DORMA Hüppe Raumtrennsysteme GmbH
Date of sampling:	30/07/2021
Location of sampling:	Westerstede/Ocholt
Date of production:	30/07/2021
Date of report:	24/11/2022
Number of pages of report:	20
Testing 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

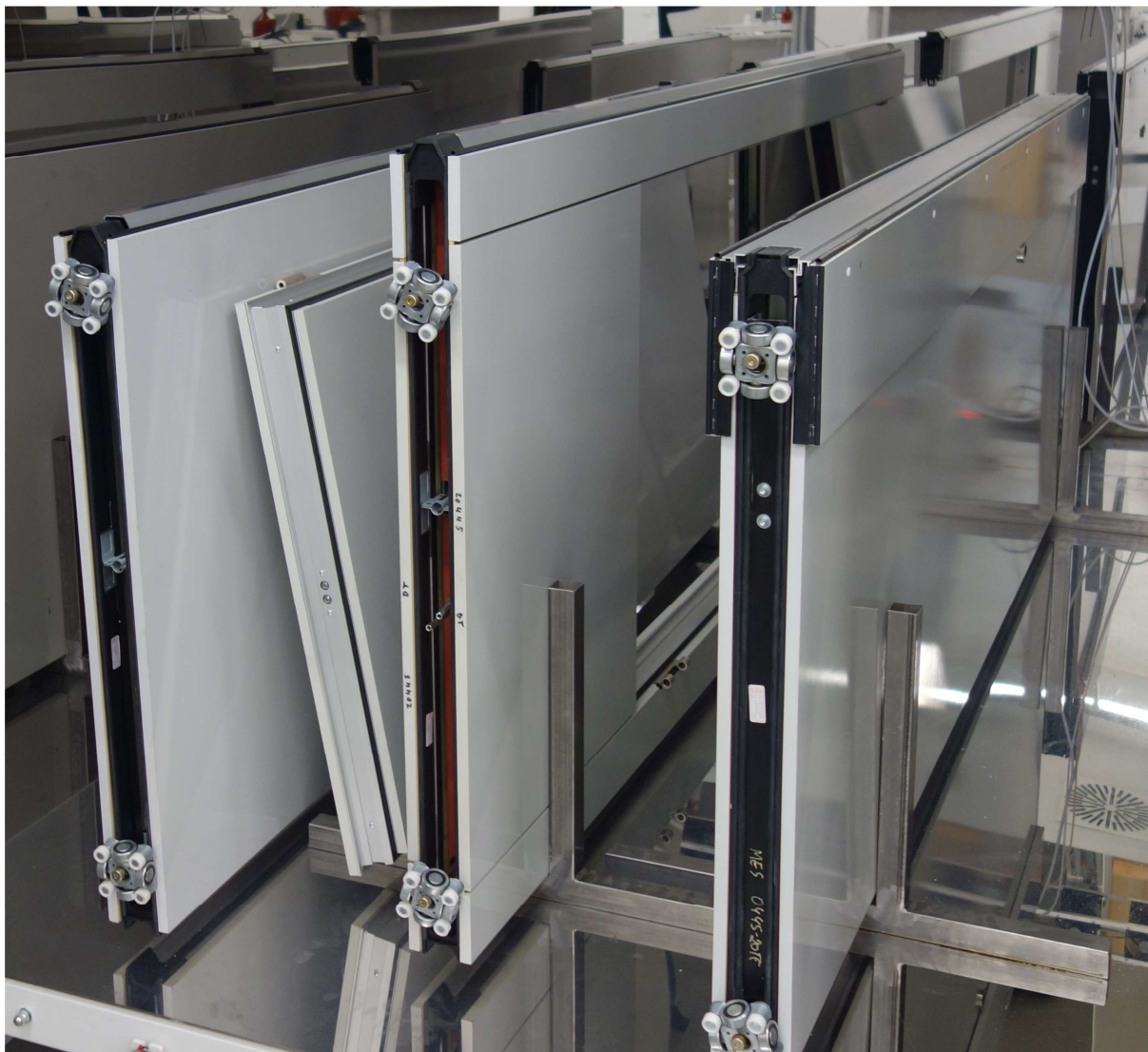


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Sample View

Internal sample number (assigned by the laboratory)	Article designation according to order	Sample/batch number according to order	Receipt of sample	Condition upon delivery	Type of sample
56596-A001	Variflex Teleskeelement	individually manufactured	29/07/2021	without objection	Mobile partition
56596-A002	Variflex Vollwandelement	individually manufactured	04/08/2021	without objection	Mobile partition
56596-A003	Variflex Durchgangstür	individually manufactured	04/08/2021	without objection	Mobile partition



56596-A001
56596-A002
56596-A003



Statement of conformity with AgBB 2021

The samples with the internal sample numbers 56596-A001, 56596-A002 and 56596-A003 have been tested on behalf of **DORMA Hüppe Raumtrennsysteme GmbH**. The article description according to the order is **Variflex komplette mobile Trennwand mit HPL-Oberfläche**.

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.¹

Test parameter	Result	Requirement	Requirement hold [yes/no]
Emission analysis			
Measurement time: 3 days after test chamber loading			
Sum VOC (C6-C16) ¹⁾	0.033 mg/m ³	≤ 10 mg/m ³	yes
Carcinogenic substances, cat. 1A and 1B acc. to Regulation (EC) No. 1272/2008 (and TRGS 905) (per substance)	≤ 0.01 mg/m ³	≤ 0.01 mg/m ³	yes
Measurement time: 28 days after test chamber loading			
Sum VOC (C6-C16) including SVOC with LCI ¹⁾	0.021 mg/m ³	≤ 1.0 mg/m ³	yes
Sum SVOC without LCI (C ₁₆ -C ₂₂) ¹⁾	< 0.005 mg/m ³	≤ 0.1 mg/m ³	yes
R-value (dimensionless)	0.28	≤ 1	yes
Sum VOC without LCI	< 0.005 mg/m ³	≤ 0.1 mg/m ³	yes
Carcinogenic substances, cat. 1A and 1B acc. to Regulation (EC) No. 1272/2008 (and TRGS 905) (per substance)	≤ 0.001 mg/m ³	≤ 0.001 mg/m ³	yes

¹⁾ For sum VOC (C₆-C₁₆) and sum SVOC (C₁₆-C₂₂) only substances ≥ 5 µg/m³ are considered.

¹ 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/).



Summary statement of conformity with AgBB 2021

The samples with the internal sample numbers 56596-A001, 56596-A002 and 56596-A003, article description according to order: **Variflex komplette mobile Trennwand mit HPL-Oberfläche**, meet the emission requirements of the AgBB scheme.

Cologne, 24/11/2022

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

A001, A002, A003, Preparation of test sample

Date: 03/08/2021
Sample preparation: not applicable; front and rear taken into account for the loading factor
Masking of backside: no
Masking of edges: no
Relationship of unmasked edges to surface: not applicable
Loading: related to area
Dimensions: complete material

A001, A002, A003, Test chamber conditions according to DIN ISO 16000-9:2008-04

Chamber volume: 20 m³
Temperature: 23 °C ± 1 °C
Relative humidity: 50 % ± 1 %
Air pressure: normal
Air: cleaned
Air change rate: 0.57 h⁻¹
Air velocity: 0.3 m/s
Loading: 1.13 m²/m³
Specific air flow rate: 0.504 m³/(m² · h)
Starting time of the test (t₀): 03/08/2021
Air sampling: 3 days after test chamber loading
28 days after test chamber loading

Analytics

Aldehydes and ketones | DIN ISO 16000-3:2013-01
Limit of quantification: 2 µg/m³
Volatile organic compounds | DIN ISO 16000-6:2022-03
Limit of quantification: 1 µg/m³ (1,4-Cyclohexanedimethanol, Diethylene glycol,
1,4-Butanediol: 5 µg/m³)
Note for analysis: not specified

1.1 Sample A001, A002, A003, 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:	56596-A001
	56596-A002
	56596-A003

No.	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]	CMR Classifi- cation++	LCI AgBB 2021 [µg/m³]	R-value
1	Aromatic hydrocarbons							
1-25	Styrene	100-42-5	11.11	1	< 5	Group 2A	250	0.00
3	Terpenes							
3-1	delta-3-Carene	498-15-7	13.8	2	< 5		1500	0.00
3-2	alpha-Pinene	80-56-8	12.13	8	< 5		2500	0.00
3-3	beta-Pinene	127-91-3	13.22	1	< 5		1400	0.00
3-4	Limonene	138-86-3	14.2	1	< 5		5000	0.00
7	Aldehydes							
7-2	Pentanal (Valeraldehyde)	110-62-3	6.77	2	< 5		800	0.00
7-3	Hexanal	66-25-1	8.8	3	< 5		900	0.00
7-20	Acetaldehyde	75-07-0		8	n. d.	Carc. 1B Muta. 2	300	0.03
7-22	Formaldehyde	50-00-0		28	n. d.	Carc. 1B Muta. 2	100	0.28
8	Ketones							
8-10	Acetone	67-64-1		13	n. d.		120000	0.00



No.	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]	CMR Classifi- cation++	LCI AgBB 2021 [µg/m³]	R-value
9	Acids							
9-1	Acetic acid	64-19-7	4.91	25	10		1200	0.02
9-2	Propionic acid	79-09-4	6.21	2	< 5		1500	0.00
13	Other identified substances in addition to LCI list							
	2-Heptanone	110-43-0	13.2	2	< 5			
	Hexamethylcyclotrisiloxane (D3)	541-05-9	8.8	3	< 5			
	several unidentified substances*		6.0- 6.5	4	< 5			
	presumably glyceryl triacetate m/z 43 103 145*		20.5	3	< 5			

+ 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 components*	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	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 3 days [µg/m³]	SERa [µg/(m² · h)]
Sum of VOC according to DIN EN 16516	10	5
Sum of VOC according to AgBB 2021	33	17
Sum of VOC according to eco-INSTITUT-Label	57	29
Sum of VOC according to ISO 16000-6	69	35

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	< 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

TWOC, Total very volatile organic compounds	Concentration after 3 days [µg/m³]	SERa [µg/(m² · h)]
Sum of VVOC according to AgBB 2021	49	25
Sum of VVOC according to eco-INSTITUT-Label	49	25

*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)	12	6
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)	36	18
Sensitising compounds with the following categorisations: DFG (MAK list): Category IV; Regulation (EC) No. 1272/2008: skin sensitising, respiratory sensitising; TRGS 907 (sum)	42	21
Bicyclic Terpenes (sum)	11	5.5
C9 - C14 Alkanes / Isoalkanes as dekane-equivalent (sum)	2	1
C4 - C11 Aldehydes, acyclic, aliphatic (sum)	5	2.5
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	0.34
R-value according to AgBB 2021	0.33
R-value according to Belgian regulation	0.33
R-value according to EU-LCI	0.33

Note:

Due to different requirements in the respective guidelines, the calculation of TVOC, TWOC, 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, A002, A003, 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:	56596-A001
	56596-A002
	56596-A003

No.	Substance	CAS No.	RT [min]	Concentration+ calib. substances ≥ 1 µg/m ³ uncalib. substances ≥ 1 µg/m ³ DNPH ≥ 2 µg/m ³ [µg/m ³]	Toluene- equivalent substances ≥ 5 µg/m ³ [µg/m ³]	CMR Classifi- cation++	LCI AgBB 2021 [µg/m ³]	R-value
3	Terpenes							
3-2	alpha-Pinene	80-56-8	11.76	3	< 5		2500	0.00
7	Aldehydes							
7-3	Hexanal	66-25-1	8.48	2	< 5		900	0.00
7-20	Acetaldehyde	75-07-0		6	n. d.	Carc. 1B Muta. 2	300	0.02
7-22	Formaldehyde	50-00-0		24	n. d.	Carc. 1B Muta. 2	100	0.24
8	Ketones							
8-10	Acetone	67-64-1		10	n. d.		120000	0.00
9	Acids							
9-1	Acetic acid	64-19-7	4.7	21	8		1200	0.02
9-2	Propionic acid	79-09-4	5.93	2	< 5		1500	0.00
13	Other identified substances in addition to LCI list							
	Hexamethylcyclotrisiloxane (D3)	541-05-9	8.49	3	< 5			
	presumably glyceryl triacetate m/z 43 103 145*		19.96	2	< 5			

+ 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 components*	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	8	4
Sum of VOC according to AgBB 2021	21	11
Sum of VOC according to eco-INSTITUT-Label	33	17
Sum of VOC according to ISO 16000-6	42	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	< 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

TWOC, Total very volatile organic compounds	Concentration after 28 days [µg/m³]	SERa [µg/(m² · h)]
Sum of VVOC according to AgBB 2021	40	20
Sum of VVOC according to eco-INSTITUT-Label	40	20

*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).

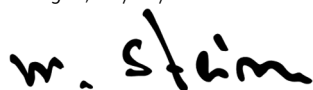
Other sums of VOC	Concentration after 28 days [µg/m³]	SERa [µg/(m² · h)]
VOC without LCI according to AgBB 2021 (sum)	< 5	< 2.5
VOC without LCI according to eco-INSTITUT-Label (sum)	5	2.5
CMR 2: VOC (incl. VVOC and SVOC) with the following categorisations: Regulation (EC) No. 1272/2008: Category Carc. 2, Muta. 2, Repr. 2; TRGS 905: K2, M2, R2; IARC: Group 2B; DFG (MAK list): Category III3 (sum)	30	15
Sensitising compounds with the following categorisations: DFG (MAK list): Category IV; Regulation (EC) No. 1272/2008: skin sensitising, respiratory sensitising; TRGS 907 (sum)	27	14
Bicyclic Terpenes (sum)	3	1.5
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	0.28
R-value according to AgBB 2021	0.28
R-value according to Belgian regulation	0.28
R-value according to EU-LCI	0.28

Note:

Due to different requirements in the respective guidelines, the calculation of TVOC, TWOC, 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, 24/11/2022



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



Appendix

Sampling sheet



Probenahmebegleitblatt*

Projektnummer
 eco-INSTITUT /
 wird vom Labor
 ausgefüllt

56596-001-003

Prüflabor	eco-INSTITUT Germany GmbH Schanzenstr. 6-20, D-51063 Köln Tel. +49 (0)221 - 931245-0 Fax +49 (0)221 - 931245-33	Probenehmer (Name, Firma, Telefon)	DORMA Hüppe Raumtrennsysteme GmbH Industriestrasse 5 D-26655 Westerstede/Ocholt
Name des Herstellers / Händlers am Probenahmeort (Adresse / Stempel)	DORMA Hüppe Raumtrennsysteme GmbH Industriestrasse 5 D-26655 Westerstede/Ocholt	Auftraggeber/ Rechnungsempfänger (falls abweichend vom Herstellernamen)	

Produktname	Variflex komplette mobile Trennwand mit HPL-Oberfläche	Probearart (z.B. Holzwerkstoff, Bodenbelag)	Mobile Trennwand
Modell / Programm/ Serie Artikel-Nr.	Vollwandelement, Durchgangstür, Teleskeelement. Rollen/Abhängen	Chargen-Nr.	individuell gefertigt
		Produktionsdatum der Charge	30.07.21

Probe wird gezogen ...	<input checked="" type="checkbox"/> aus der laufenden Produktion <input type="checkbox"/> aus Lagerbeständen	Datum der Probenahme	30.07.21
		Uhrzeit	14:00
Wo wurde das Produkt vor Probenahme gelagert?	<input checked="" type="checkbox"/> Fertigung <input type="checkbox"/> Lager <input type="checkbox"/> Sonstiges Lagerort:	Wie wurde das Produkt vor Probenahme gelagert?	<input type="checkbox"/> offen <input checked="" type="checkbox"/> verpackt Verpackungsmaterial: direkt nach Fertigstellung verpackt

Besonderheiten (mögliche negative Einflüsse durch Emissionen am Probenahmeort (z.B. Benzin-Abgase, Lösemittlemissionen aus der Fertigung), Unklarheiten, Fragen, etc.)

Bestätigung
 Hiermit bestätigt der Unterzeichner die Richtigkeit der oben gemachten Angaben. Die Probe wurde eigenhändig gemäß Probenahmeanleitung ausgewählt, gezogen und verpackt.
 Datum: Unterschrift:(Stempel)

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

Beauftragung

(Bitte Angebotsnummer eintragen bzw. falls nicht vorhanden, Untersuchungsziel angeben) 04205



List of calibrated Volatile Organic Compounds (VOC)

Aromatic hydrocarbons (31)

Benzene⁴
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)
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-Phenyldecane²
1-Phenylundecane²
Indene
Naphthalene
1-Methylnaphthalene
2-Methylnaphthalene
1,4-Dimethylnaphthalene

Aliphatic hydrocarbons (23)

2-Methylpentane¹
3-Methylpentane¹
Methylcyclopentane
n-Hexane
Cyclohexane
Methylcyclohexane
1,4-Dimethylcyclohexane
n-Heptane
2,2,4,6,6-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)

Ethanol¹
1-Propanol¹
2-Propanol¹
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)¹
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
Ethylidiglycol
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^{1,3,4}
Acetaldehyde^{1,3,4}
Propanal^{1,3}
Butanal^{1,3}
3-Methyl-1-butanal
Pentanal
Hexanal
2-Ethylhexanal
Heptanal
Octanal
Nonanal
Decanal
Propenal (Acrolein)^{1,3}
Isobutenal (Methacrolein)³
2-Butenal³
2-Pentenal³
2-Hexenal
2-Heptenal
2-Octenal

2-Nonenal
2-Decenal
2-Undecenal
Ethanedial (Glyoxal)^{1,3}
Glutaraldehyde
Furfural
Benzaldehyde

Ketones (14)

Acetone^{1,3}
1-Hydroxyacetone
Ethylmethylketone³
Methylisobutylketone
3-Methyl-2-butanone
Cyclopentanone
2-Methylcyclopentanone
Cyclohexanone
2-Methylcyclohexanone
2-Hexanone
2-Heptanone
Acetophenone
Isophorone
Benzophenone²

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 (31)

Methyl acetate¹
Ethyl acetate¹
Vinyl acetate¹
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
Hexanediol diacrylate
Dipropylene glycol diacrylate
Dimethyl succinate
Dimethyl glutarate
Dimethyl adipate
Dibutyl fumarate
Dibutyl maleate
Diisobutyl succinate
Diisobutyl glutarate
Butyrolactone
Dimethyl phthalate
Diethyl phthalate²
Dipropyl phthalate²
Dibutyl phthalate²
Diisobutyl phthalate²

Chlorinated hydrocarbons (17)

Dichloromethane¹
Trichloromethane (Chloroform)⁴
Tetrachloromethane
1,2-Dichloroethane⁴
1,1,1-Trichloroethane
2-Chloropropane
1,2,3-Trichloropropane⁴
Trichloroethene⁴
Tetrachloroethene
trans-1,3-Dichloropropene⁴
cis-1,3-Dichloropropene⁴
Chloroprene⁴
1,3-Dichloro-2-propanol⁴
Chlorobenzene
1,4-Dichlorobenzene
alpha-Chlorotoluene⁴
alpha,alpha,alpha-Trichlorotoluene⁴

Cyclic siloxanes (5)

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

Others (41)

1,4-Dioxane⁴
1,2-Dibromoethane⁴
2-Nitropropane⁴
2,3-Dinitrotoluene⁴
2,4-Dinitrotoluene⁴
2,6-Dinitrotoluene⁴
3,4-Dinitrotoluene^{2,4}
o-Anisidine⁴
o-Toluidine⁴
4-Chloro-o-toluidine⁴
5-Nitro-o-toluidine²
Acrylonitrile^{1,4}
2,2'-Azobisisobutyronitrile
Tetramethylsuccinonitrile
Azobenzene^{2,4}
Caprolactam
Furan^{1,4}
2-Methylfuran
2-Pentylfuran
Methenamine
Triethylamine
2-Butanonoxime⁴
Triethyl phosphate
Tributyl phosphate²
5-Chloro-2-methyl-4-isothiazolin-3-one (CIT)
2-Methyl-4-isothiazolin-3-one (MIT)
2-n-Octyl-4-isothiazolin-3-one (OIT)^{2,4}
Formamide
Dimethylformamide (DMF)
Acetamide
N-Nitrosopyrrolidine⁴
N-Methyl-2-pyrrolidone
N-Ethyl-2-pyrrolidone
N-Butyl-2-pyrrolidone
Aniline
4-Chloroaniline⁴
2-Nitroanisole⁴
Cyclohexyl isocyanate
p-Cresidine⁴
Diethyl sulfate⁴
Epichlorohydrin⁴

1 WVOC

2 SVOC

3 Analysis acc. to DIN ISO 16000-3:2013-01 (DNPH)

4 Carcinogens, category 1A and 1B according to Regulation (EC) No 1272/2008 and TRGS 905

Definition of terms

VOC (volatile organic compounds)	All individual compounds with a concentration $\geq 1 \mu\text{g}/\text{m}^3$ in the retention range C_6 (n-Hexane) to C_{16} (n-Hexadecane)
TVOC	Total volatile organic compounds
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, among others, with M1)
TVOC according to AgBB	Sum of all identified and calibrated VOC $\geq 5 \mu\text{g}/\text{m}^3$ with LCI and not calibrated VOC $\geq 5 \mu\text{g}/\text{m}^3$ calculated as toluene equivalent (also used, among others, for the Blue Angel)
TVOC according to eco-INSTITUT-Label	Sum of all identified and calibrated VOC $\geq 1 \mu\text{g}/\text{m}^3$ and not calibrated VOC $\geq 1 \mu\text{g}/\text{m}^3$ calculated as toluene equivalent (also used for natureplus)
TVOC according to DIN ISO 16000-6	Total area of chromatogram in the retention range C_6 to C_{16} , calculated as toluene equivalent (used, among others, by CDPH, BIFMA or the French VOC Regulation)
TVOC without LCI according to AgBB	Sum of all VOC without NIK $\geq 5 \mu\text{g}/\text{m}^3$ in the retention range C_6 to C_{16}
TVOC without LCI according to eco-INSTITUT-Label	Sum of all VOC without NIK $\geq 1 \mu\text{g}/\text{m}^3$ in the retention range C_6 to C_{16}
CMR-VOC (carcinogenic, mutagenic, reproduction-toxic VOC, VVOC and SVOC)	All individual substances with the following categories: Regulation (EC) No. 1272/2008: Category Car.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 lists): Category III1 and III2
VVOC (very volatile organic compounds)	All individual substances with a concentration $\geq 1 \mu\text{g}/\text{m}^3$ in the retention range $< C_6$
TVVOC	Total very volatile organic compounds
TVVOC according to AgBB	Sum of all identified and calibrated VVOC $\geq 5 \mu\text{g}/\text{m}^3$ with LCI
TVVOC according to eco-INSTITUT-Label	Sum of all identified and calibrated VVOC $\geq 1 \mu\text{g}/\text{m}^3$ with LCI
SVOC (semi volatile organic compounds)	All individual substances $\geq 1 \mu\text{g}/\text{m}^3$ in the retention range C_{16} (n-hexadecane) to C_{22} (docosane)
TSVOC	Total semi volatile organic compounds
TSVOC according to DIN EN 16516	Sum of all SVOC in the retention range C_{16} to C_{22} , calculated as toluene equivalent
TSVOC without LCI according to AgBB	Sum of all SVOC $\geq 5 \mu\text{g}/\text{m}^3$ without LCI
TSVOC without LCI according to eco-INSTITUT-Label	Sum of all SVOC $\geq 1 \mu\text{g}/\text{m}^3$ without LCI
TSVOC with LCI according to AgBB	Sum of all substance-specific calibrated and SVOC $\geq 5 \mu\text{g}/\text{m}^3$ with LCI
SER	Specific emission rate (see "Explanation of Specific Emission Rate SER")
LCI value	Lowest Concentration of Interest; calculated value for the evaluation of VOC, established by the Committee for Health-related Evaluation of Building Products (Ausschuss zur gesundheitlichen Bewertung von Bauprodukten - AgBB)



R value	The quotient of the concentration and the LCI value is generated for every substance which is detected in the test chamber air. The sum of the calculated quotients results in the R value.
R value according to eco-INSTITUT-Label	R value for all identified substances $\geq 1 \mu\text{g}/\text{m}^3$ with LCI, established by the AgBB
R value according to AgBB	R value for all identified substances $\geq 5 \mu\text{g}/\text{m}^3$ with LCI, established by the AgBB
R value according to Belgian regulation	R value for all identified substances $\geq 5 \mu\text{g}/\text{m}^3$ with LCI, established by the Belgian regulation
R value according to EU-LCI	R value for all identified substances $\geq 5 \mu\text{g}/\text{m}^3$ with EU-LCI value, established by the European Commission
RT (retention time)	Time for a particular analyte to pass through the system (from the column inlet to the detector)
CAS No. (Chemical Abstracts Service)	International unique numerical identifier for a chemical substance
Toluene equivalent	Concentration of the substance detected in the test chamber air for which the quantification was carried out with regard to toluene.

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. Standardized 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 derivatized with DNPH for the determination of formaldehyde and other short-chain carbonyl compounds (C1 - C6) are analysed using high-performance liquid chromatography (HPLC).

Over 200 compounds, including volatile organic compounds (C6 - C16), semi-volatile organic compounds (C16 - C22) and – insofar as possible with this method – also very volatile organic compounds (less than C6) are determined and quantified individually.

All other substances – insofar as is 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 m³ test chamber air or 2 µg/m³ 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 ²)	relation between emission and surface
v = unit volume (m ³)	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 _l	in µg/(m·h)
surface-specific	SER _a	in µg/(m ² ·h)
volume-specific	SER _v	in µg/(m ³ ·h)
unit specific	SER _u	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.