eco-INSTITUT Germany GmbH

Laborprüfung
Laboratory testing

Junkers & Müllers GmbH
Bolksbuscher Straße 27
41239 Mönchengladbach

Test Report No. 60265-A001-L

Test objective:	Emission analysis
Article designation according to order:	APOLLO BLO FR Tested as a substitute for the products: - STARLET BLO UPCYCLING FR - STARLET BLO COLOR UPCYCLING FR - STARLET BLO COLOR FR - STARLET BLO FACADE UPCYCLING FR - OPERA BLO FACADE MEDI CARE FR - JM SILKSHADE BLO FR - SAHARA BLO FR - VENTO BLO - LIMA BLO - CARINA BLO - CARINA BLO COLOR - STARLET DIO UPCYCLING FR - STARFLEX DIO UPCYCLING FR
Date of report:	26/08/2025
Number of pages of report:	17
Testing / responsible laboratory:	eco-INSTITUT Germany GmbH, Köln
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. Further information at www.eco-institut.de/en/advertising

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Remark: It is not permitted to publish extracts of this report and the comments on the first page of this report apply.

Sample View

Internal sample number (filled in by laboratory)	**60265-A001**
Photo of the test specimen: A001	
Article designation according to order:	APOLLO BLO FR
Sample/batch number according to order:	256589
Type of sample:	sun-shading fabric (window-covering) (roller-blind fabric, vertical-blind fabric)
Date of production:	14/07/2025
Sampling by:	Thomas Feicks, Junkers & Müllers GmbH
Date of sampling:	15/07/2025
Location of sampling:	Junkers & Müllers GmbH, Mönchengladbach, final production control
Receipt of sample / Condition upon delivery:	17/07/2025 / without objection

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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:	22/07/2025
Test specimen preparation:	sample cut to size; loading refers to one side of the test specimen, other side left open; transfer of the test specimen into the test chamber immediately after preparation
Masking of backside:	no
Masking of edges:	not applicable
Relationship of unmasked edges to surface:	not applicable
Arrangement in test chamber:	on tripod
Loading reference unit:	area-specific [m^2]
Dimensions:	11.2 cm x 11.2 cm

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

Chamber volume:	0.250 m^3
Temperature:	23 °C ± 1 °C
Relative humidity:	50 % ± 5 %
Air pressure:	normal
Air:	cleaned
Air change rate:	0.5 h^{-1}
Air velocity:	0.3 m/s
Loading:	0.05 m^2/m^3
Specific air flow rate:	10 $m^3/(m^2 \cdot h)$
Starting time of the test (t0):	22/07/2025
Air sampling:	25/07/2025 (3 days after test chamber loading) 19/08/2025 (28 days after test chamber loading)

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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

Method description / Analytics:

Formaldehyde and other carbonyl compounds:	DIN ISO 16000-3:2023-12 (DNPH method, HPLC-DAD)
Limit of quantification:	2 µg/m³
Volatile organic compounds:	DIN ISO 16000-6:2022-03 (Tenax TA®, TD-GC-MS)
Limit of quantification calibrated substances:	1 µg/m³ (1,4-Cyclohexanedimethanol, Diethylene glycol, 1,4-Butanediol: 5 µg/m³; Neodecanoic acid: 10 µg/m³)
Limit of quantification non-calibrated substances:	1 µg/m³

Test result:

Internal sample number:	60265-A001

	Substance	CAS No.	RT	Concentration+ calib. substances ≥ 1 µg/m³ uncalib. substances ≥ 1 µg/m³ DNPH ≥ 2 µg/m³	Toluene-equivalent substances ≥ 5 µg/m³	SER+	CMR Classifi-cation++	LCI AgBB 2024	R-value
			[min]	[µg/m³]	[µg/m³]	[µg/(m²·h)]		[µg/m³]	
	Aldehydes								
VVOC	Formaldehyde	50-00-0		15	n. d.	150	Carc. 1B Muta. 2	100	0.15
	Acids								
VOC	Acetic acid	64-19-7	4.47	2	< 5	20		1200	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: Categorie 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

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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	< 10
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	< 10

TVOC, Total volatile organic compounds	Concentration after 3 days [µg/m³]	SERa [µg/(m² • h)]
Sum of VOC according to DIN EN 16516	< 5	< 50
Sum of VOC according to AgBB 2024	< 5	< 50
Sum of VOC according to eco-INSTITUT-Label	2	20
Sum of VOC according to DIN ISO 16000-6	5	50

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	< 50
Sum of SVOC without LCI according to AgBB 2024	< 5	< 50
Sum of SVOC without LCI according to eco-INSTITUT-Label	< 1	< 10
Sum of SVOC with LCI according to AgBB 2024	< 5	< 50

TVVOC, Total very volatile organic compounds	Concentration after 3 days [µg/m³]	SERa [µg/(m² • h)]
Sum of VVOC according to AgBB 2024	15	150
Sum of VVOC according to eco-INSTITUT-Label	15	150

*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).

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Other sums of VOC	Concentration after 3 days [µg/m³]	SERa [µg/(m² • h)]
VOC without LCI according to AgBB 2024 (sum)	< 5	< 50
VOC without LCI according to eco-INSTITUT-Label (sum)	< 1	< 10
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)	15	150
Sensitising compounds with the following categorisations: DFG (MAK list): Category IV; Regulation (EC) No. 1272/2008: skin sensitising, respiratory sensitising; TRGS 907 (sum)	15	150
Bicyclic Terpenes (sum)	< 1	< 10
C9 - C14 Alkanes / Isoalkanes as dekane-equivalent (sum)	< 1	< 10
C4 - C11 Aldehydes, acyclic, aliphatic (sum)	< 2	< 20
C9 - C15 Alkylated benzenes (sum)	< 1	< 10
Cresols (sum)	< 1	< 10

Risk value for assessment of LCI	R-value
R-value according to eco-INSTITUT-Label	0.15
R-value according to AgBB 2024	0.15
R-value according to Belgian regulation	0.15
R-value according to EU-LCI	0.15

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.

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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

Method description / Analytics:

Formaldehyde and other carbonyl compounds:	DIN ISO 16000-3:2023-12 (DNPH method, HPLC-DAD)
Limit of quantification:	2 µg/m³
Volatile organic compounds:	DIN ISO 16000-6:2022-03 (Tenax TA®, TD-GC-MS)
Limit of quantification calibrated substances:	1 µg/m³ (1,4-Cyclohexanedimethanol, Diethylene glycol, 1,4-Butanediol: 5 µg/m³; Neodecanoic acid: 10 µg/m³)
Limit of quantification non-calibrated substances:	1 µg/m³

Test result:

Internal sample number:	60265-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
	Aldehydes								
VVOC	Formaldehyde	50-00-0		7	n. d.	70	Carc. 1B Muta. 2	100	0.07

+ 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: Categorie 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

Remark: It is not permitted to publish extracts of this report and the comments on the first page of this report apply.

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	< 10
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	< 10

TVOC, Total volatile organic compounds	Concentration after 28 days [µg/m³]	SERa [µg/(m² • h)]
Sum of VOC according to DIN EN 16516	< 5	< 50
Sum of VOC according to AgBB 2024	< 5	< 50
Sum of VOC according to eco-INSTITUT-Label	< 1	< 10
Sum of VOC according to DIN ISO 16000-6	2	20

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	< 50
Sum of SVOC without LCI according to AgBB 2024	< 5	< 50
Sum of SVOC without LCI according to eco-INSTITUT-Label	< 1	< 10
Sum of SVOC with LCI according to AgBB 2024	< 5	< 50

TVVOC, Total very volatile organic compounds	Concentration after 28 days [µg/m³]	SERa [µg/(m² • h)]
Sum of VVOC according to AgBB 2024	7	70
Sum of VVOC according to eco-INSTITUT-Label	7	70

*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).

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Other sums of VOC	Concentration after 28 days [µg/m³]	SERa [µg/(m² • h)]
VOC without LCI according to AgBB 2024 (sum)	< 5	< 50
VOC without LCI according to eco-INSTITUT-Label (sum)	< 1	< 10
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)	7	70
Sensitising compounds with the following categorisations: DFG (MAK list): Category IV; Regulation (EC) No. 1272/2008: skin sensitising, respiratory sensitising; TRGS 907 (sum)	7	70
Bicyclic Terpenes (sum)	< 1	< 10
C9 - C14 Alkanes / Isoalkanes as dekane-equivalent (sum)	< 1	< 10
C4 - C11 Aldehydes, acyclic, aliphatic (sum)	< 2	< 20
C9 - C15 Alkylated benzenes (sum)	< 1	< 10
Cresols (sum)	< 1	< 10

Risk value for assessment of LCI	R-value
R-value according to eco-INSTITUT-Label	0.07
R-value according to AgBB 2024	0.07
R-value according to Belgian regulation	0.07
R-value according to EU-LCI	0.07

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, 26/08/2025

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

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Appendix

Sampling sheet

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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!

60265-001

Order by*	Junkers & Müllers GmbH Bolksbuscher Str. 27 41239 Mönchengladbach Germany	**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
X **Name of production company**		**Sampling by*** (name, company, phone)	Thomas Feicks Junkers & Müllers GmbH +49 2166 39 39 63
Name of distribution (if different from production)		**Sampling location***	Junkers & Müllers GmbH Mönchengladbach final production control
Name of test sample/ item*	APOLLO BLO FR	**Product type** (e.g. parquet, floor covering)	sun-shading fabric (window-covering) (roller-blind fabric, vertical-blind fabric)
Article number	40798/4899	**Sample/ Batch***	256589
Model / Program / Series	JM Commercial- and JM Roller-blinds	**Production date of batch***	14.07.2025
Sample taken from	X current production storage other	**Sampling date***	15.07.2025
		Storage conditions before sampling	open X packaged
Storage location	Junkers & Müllers GmbH, Mönchengladbach	**Packaging material**	Aluminium foil / PE-foil

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) 15/07/2025

Signature JUNKERS & MÜLLERS GmbH Bolksbuscher Straße 27 41239 Mönchengladbach

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: DE60370623651701900010, BIC: GENODED1FHH

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List of calibrated Volatile Organic Compounds (VOC)

Aromatic hydrocarbons (30)
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)[4]
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-Phenyloctane
1-Phenyldecane[2]
1-Phenylundecane[2]
Indene
Naphthalene
1-Methylnaphthalene
2-Methylnaphthalene
1,4-Dimethylnaphthalene

Aliphatic hydrocarbons (24)
2-Methylpentane[1]
3-Methylpentane[1]
Methylcyclopentane
n-Pentane[1]
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)
Ethanol[1]
1-Propanol[1]
2-Propanol[1]
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
Ethyldiglycol
Ethylene glycol monobutyl ether
Diethylene glycol methyl ether
Diethylene glycol monobutyl ether
Diethylene glycol phenyl ether
Dipropylene glycol-dimetyl 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]
Isobutenal (Methacrolein)[3]
2-Butenal
2-Pentenal[3]
2-Hexenal
2-Heptenal
2-Octenal

Remark: It is not permitted to publish extracts of this report and the comments on the first page of this report apply.

2-Nonenal
2-Decenal
2-Undecenal
Ethanedial (Glyoxal)[1,3]
Glutaraldehyde
Furfural
Benzaldehyde

Ketones (14)
Acetone[1,3]
1-Hydroxyacetone
Ethylmethylketone[3]
Methylisobutylketone
3-Methyl-2-butanone
Cyclopentanone
2-Methylcyclopentanone
Cyclohexanone
2-Methylcyclohexanone
2-Hexanone
2-Heptanone
Acetophenone
Isophorone
4-Methylbenzophenone[2]

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[1]
Ethyl acetate[1]
Vinyl acetate[1]
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[2]
Dipropyl phthalate[2]
Dibutyl phthalate[2]
Diisobutyl phthalate[2]
(5-Ethyl-1,3-dioxan-5-yl)methyl acrylate

Cyclic siloxanes (5)
Hexamethylcyclotrisiloxane (D3)
Octamethylcyclotetrasiloxane (D4)
Decamethylcyclopentasiloxane (D5)
Dodecamethylcyclohexasiloxane (D6)
Tetradecamethylcycoheptasiloxane (D7)

Carcinogens (44)
Isopropylbenzene (Cumene)[4]
Benzene[4]
Benzophenone[4]
Trichloromethane (Chloroform)[4]
1,2-Dichloroethane[4]
1,2,3-Trichloropropane[4]
Trichloroethene[4]
trans-1,3-Dichloropropene[4]
cis-1,3-Dichloropropene[4]
Chloroprene[4]
1,3-Dichloro-2-propanol[4]
alpha-Chlorotoluene[4]
alpha,alpha,alpha-Trichlorotoluene[4]
1,4-Dioxane[4]
1,2-Dibromoethane[4]
2-Nitropropane[4]
2,3-Dinitrotoluene[4]
2,4-Dinitrotoluene[4]
2,6-Dinitrotoluene[4]
3,4-Dinitrotoluene[2,4]
o-Anisidine[4]
o-Toluidine[4]
4-Chloro-o-toluidine[4]
Acrylonitrile[1,4]
Azobenzene[2,4]
Furan[1,4]
2-Butanonoxime[4]
N-Nitrosopyrrolidine[4]
4-Chloroaniline[4]
2-Nitroanisole[4]
p-Cresidine[4]
Diethyl sulfate[4]
Epichlorohydrin[4]
1,2-Dichloropropane[4]
Urethane[4]
Acrylamide[4]
trans-1,4-Dichlorobut-2-ene[4]
1,2-Dibromo-3-chloropropane[4]
2-Nitrotoluene[4]
Quinoline[4]
Phenylglycidyl ether[4]
2,4,5-Trimethylaniline[4]
4-Chlorobenzotrichloride[4]
Nitrosodipropylamin[4]

Others (35)
5-Nitro-o-toluidine[2]
2,2'-Azobisisobutyronitrile
Tetramethylsuccinonitrile
Caprolactam
2-Methylfuran
2-Pentylfuran
Methenamine
Diethylamine[1]
Triethylamine
Triethylene diamine (DABCO®)
Triethyl phosphate
Tributyl phosphate[2]
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
N-Methylformamide
Dimethylformamide (DMF)
Acetamide
N-Methyl-2-pyrrolidone
N-Ethyl-2-pyrrolidone
N-Butyl-2-pyrrolidone
Aniline[5]
Cyclohexyl isocyanate
5-Ethyl-1,3-dioxan-5-methanol
Dichloromethane[1]
Tetrachloromethane
1,1,1-Trichloroethane
2-Chloropropane
Tetrachloroethene
Chlorobenzene
1,4-Dichlorobenzene
1,1-Dichlorethene[1]
2-Pentanone oxime
Tribromomethane (Bromoform)

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: June 2025)

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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 µg/m³
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 ≥ 5 µg/m³ with LCI value, calculated according to the LCI list of the AgBB scheme
R-value according to Belgian regulation	R-value for all substances ≥ 5 µg/m³ 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 ≥ 1 µg/m³ with LCI value, calculated according to the LCI list of the AgBB scheme
R value according to EU-LCI	R-value for all substances ≥ 5 µg/m³ 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 ≥ 5 µg/m³ (as toluene equivalent)
TSVOC with LCI according to AgBB	Sum of all SVOC with LCI ≥ 5 µg/m³ (quantified substance-specific)
TSVOC with LCI according to eco-INSTITUT-Label	Sum of all SVOC with LCI ≥ 1 µg/m³ (quantified substance-specific)
TSVOC without LCI according to AgBB	Sum of all SVOC without LCI ≥ 5 µg/m³ (as toluene equivalent)
TSVOC without LCI according to eco-INSTITUT label	Sum of all calibrated SVOC without LCI ≥ 1 µg/m³ (quantified substance-specific) and all non-calibrated SVOC without LCI ≥ 1 µg/m³ (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)

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TVOC according to DIN EN 16516	Sum of all VOC ≥ 5 µg/m³ 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 ≥ 5 µg/m³ (quantified substance-specific) and all VOCs without LCI ≥ 5 µg/m³ (as toluene equivalent) (used i.a. for the Blue Angel)
TVOC according to eco-INSTITUT-Label	Sum of all calibrated VOC ≥ 1 µg/m³ (quantified substance-specific) and all non-calibrated VOC ≥ 1 µg/m³ (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 ≥ 5 µg/m³ as toluene equivalent
TVOC without LCI according to eco-INSTITUT-Label	Sum of all calibrated VOCs without LCI ≥ 1 µg/m³ (quantified substance-specific) and all non-calibrated VOCs without LCI ≥ 1 µg/m³ (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 ≥ 5 µg/m³ (quantified substance-specificic) and all VVOC without LCI ≥ 5 µg/m³ (as toluene equivalent)
TVVOC according to eco-INSTITUT-Label	Sum of all calibrated VVOC ≥ 1 µg/m³ (substance-specific quantified) and all non-calibrated VVOC ≥ 1 µg/m³ (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)

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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 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 29.3 %. The calculation is based on DIN ISO 11352:2013-03 (Nordtest).

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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.

$$SER = q \cdot c$$

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.

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