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55/1A Khuong Viet Street Phu Trung Ward, Tan Phu District
Ho Chi Minh City
Vietnam

Test Report No. 57337-A001-A002-L

Test objective:	Analysis according to eco- INSTITUT -Label-criteria
Name of test sample/item by client:	A001: C. Fusion Latex Pillow A002: Natural Latex mattress core
Sample/batch by client:	A001: 080414019 A002: 080402019
Sampled by:	Le Huu Nghi, International Enviroment Co.Ltd
Date of sampling:	16/04/2022
Location of sampling:	35/10, 48 Street, 14 Ward, Go Vap District, Ho Chi Minh City, Vietnam
Date of production:	14/04/2022
Date of arrival of sample:	25/04/2022
Processing period:	25/04/2022 - 08/06/2022
Date of report:	08/06/2022
Number of pages of report:	27
Testing laboratory:	eco- INSTITUT Germany GmbH, Köln
Note:	The test results in the report refer exclusively to the submitted test sample. The report may only be used in product and company advertising if a valid certificate is available that refers to this report. More information at www.eco-institut.de/en/advertising



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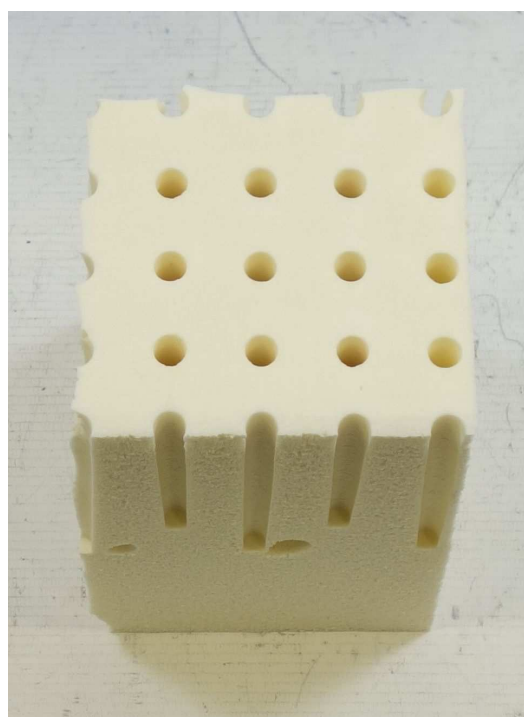
‡ subcontracted, # outside accreditation

Sample View

Internal sample number (assigned by the laboratory)	Test sample / item by client	Sample/batch number by client	Condition upon delivery	Type of sample
57337-A001	C. Fusion Latex Pillow	080414019	without objection	Pillow
57337-A002	Natural Latex mattress core	080402019	without objection	Mattress core



57337-A001



57337-A002

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

A002, Preparation of test sample

Date: 25/05/2022
Sample preparation: not applicable
Masking of backside: no
Masking of edges: no
Relationship of unmasked edges to surface: not applicable
Loading: related to area
Dimensions: 10.1 cm x 10.1 cm x 15 cm

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

Chamber volume: 0.125 m³
Temperature: 23 °C ± 1 °C
Relative humidity: 50 % ± 1 %
Air pressure: normal
Air: cleaned
Air change rate: 0.5 h⁻¹
Air velocity: 0.3 m/s
Loading: 0.65 m²/m³
Specific air flow rate: 0.769 m³/(m² · h)
Starting time of the test (t₀): 25/05/2022
Air sampling: 2 days after test chamber loading
7 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 16000-6:2012-11
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 A002, Volatile Organic Compounds after 2 days

Test objective:

Volatile Organic Compounds (VOC), test chamber, air sampling 2 days after test chamber loading

Test result:

Internal sample number: | 57337-A002

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 2018 [µg/m³]	R-value
1	Aromatic hydrocarbons							
1-11	1,2,4-Trimethylbenzene	95-63-6	13.01	2	< 5		450	0.00
2	Aliphatic hydrocarbons (n-, iso- and cyclo-)							
2-10.2	n-Decane	124-18-5	12.8	1	< 5		6000	0.00
4	Aliphatic mono alcohols (n-, iso-, cyclo-) and dialcohols							
4-6	1-Butanol	71-36-3	5.78	1	< 5		3000	0.00
4-10	2-Ethyl-1-hexanol	104-76-7	13.44	1	< 5		300	0.00
5	Aromatic alcohols							
5-2	2,6-Di-tert-butyl-4-methylphenol (BHT)	128-37-0	23.67	2	< 5	Group 3	100	0.02
7	Aldehydes							
7-7	Nonanal	124-19-6	15.1	2	< 5		900	0.00
7-19	Benzaldehyde	100-52-7	12.35	1	< 5		90	0.01
7-20	Acetaldehyde	75-07-0		2	n. d.	Carc. 1B Muta. 2	1200	0.00
7-22	Formaldehyde	50-00-0		3	n. d.	Carc. 1B Muta. 2	100	0.03
8	Ketones							
8-10	Acetone	67-64-1		6	n. d.		1200	0.01
9	Acids							
9-1	Acetic acid	64-19-7	4.59	5	< 5		1200	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 2018 [µg/m³]	R-value
10	Esters							
10-15	n-Butyl acrylate	141-32-2	10.43	2	< 5	Group 3	110	0.02
12	Others							
12-4	Octamethylcyclotetrasiloxane (D4)	556-67-2	11.94	4	< 5	Repr. 2	1200	0.00
12-12	Decamethylcyclopentasiloxane (D5)	541-02-6	15.21	1	< 5		1500	0.00
13	Other identified substances in addition to LCI list							
	Benzothiazole	95-16-9	18.41	7	5			
	probably Diethylamine m/z 57 44 73*		4.5	8	8			
	probably Amine m/z 57 44 73*		5.09	1	< 5			
	probably Diethylformamide m/z 57 101 86*		11.42	4	< 5			
	several not identified substances*		12.66-18	30	30			
	m/z 57 97 153*		20.1	2	< 5			
	m/z 57 121 149*		20.65	2	< 5			
	Sesquiterpene*		21.74	2	< 5			
	m/z 129 57 69*		25.8	1	< 5			
2-11	Other saturated aliphatic hydrocarbons C17 - C22*	--	29.64	6	6		1000	0.01

+ identified and calibrated substances, substance specific calculated

++ Classification according to Regulation (EG) N° 1272/2008: Categories 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: Kategorie III1 and III2

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

Carcinogenic, mutagenic and reproductive toxic components*	Concentration after 2 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	< 0.77
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	< 0.77

TVOC, Total volatile organic compounds	Concentration after 2 days [µg/m³]	SERa [µg/(m² · h)]
Sum of VOC according to DIN EN 16516	35	27
Sum of VOC according to AgBB 2021	40	31
Sum of VOC according to eco-INSTITUT-Label	71	55
Sum of VOC according to ISO 16000-6	68	52

TSVOC, Total semi volatile organic compounds	Concentration after 2 days [µg/m³]	SERa [µg/(m² · h)]
Sum of SVOC according to DIN EN 16516	6	4.6
Sum of SVOC without LCI according to AgBB 2021	< 5	< 3.9
Sum of SVOC without LCI according to eco-INSTITUT-Label	< 1	< 0.77
Sum of SVOC with LCI according to AgBB 2021	6	4.6

TWOC, Total very volatile organic compounds	Concentration after 2 days [µg/m³]	SERa [µg/(m² · h)]
Sum of VVOC according to AgBB 2021	14	11
Sum of VVOC according to eco-INSTITUT-Label	19	15

*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 2 days [µg/m³]	SERa [µg/(m² · h)]
VOC without LCI according to AgBB 2021 (sum)	37	28
VOC without LCI according to eco-INSTITUT-Label (sum)	49	38
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	6.9
Sensitising compounds with the following categorisations: DFG (MAK list): Category IV; Regulation (EC) No. 1272/2008: skin sensitising, respiratory sensitising; TRGS 907 (sum)	5	3.9
Bicyclic Terpenes (sum)	< 1	< 0.77
C9 - C14 Alkanes / Isoalkanes as dekane-equivalent (sum)	< 1	< 0.77
C4 - C11 Aldehydes, acyclic, aliphatic (sum)	2	1.5
C9 - C15 Alkylated benzenes (sum)	2	1.5
Kresoles (sum)	< 1	< 0.77

Risk value for assessment of LCI	R-value
R-value according to eco-INSTITUT-Label	0.11
R-value according to AgBB 2021	0.01
R-value according to Belgian regulation	0.01
R-value according to EU-LCI	0.00

Note:

Due to different requirements in the respective guidelines, the calculation of TVOC, TVOC, 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 A002, Volatile Organic Compounds after 7 days

Test objective:

Volatile Organic Compounds (VOC), test chamber, air sampling 7 days after test chamber loading

Test result:

Internal sample number: | 57337-A002

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							
1-1	Toluene	108-88-3	7.92	2	< 5	Repr. 2	2900	0.00
4	Aliphatic mono alcohols (n-, iso-, cyclo-) and dialcohols							
4-6	1-Butanol	71-36-3	5.8	1	< 5		3000	0.00
5	Aromatic alcohols							
5-2	2,6-Di-tert-butyl-4-methylphenol (BHT)	128-37-0	23.64	2	< 5	Group 3	100	0.02
7	Aldehydes							
7-7	Nonanal	124-19-6	15.08	1	< 5		900	0.00
7-22	Formaldehyde	50-00-0		2	n. d.	Carc. 1B Muta. 2	100	0.02
9	Acids							
9-1	Acetic acid	64-19-7	4.58	3	< 5		1200	0.00
12	Others							
12-4	Octamethylcyclotetrasiloxane (D4)	556-67-2	11.93	4	< 5	Repr. 2	1200	0.00
13	Other identified substances in addition to LCI list							
	Benzothiazole	95-16-9	18.38	7	6			
	probably Diethylamine m/z 57 44 73*		4.5	2	< 5			
	probably Diethylformamide m/z 57 101 86*		11.42	1	< 5			
	several not identified substances*		12.66-18	9	9			
	m/z 57 97 153*		20.1	1	< 5			
	m/z 57 121 149*		20.65	1	< 5			



No.	Substance	CAS No.	RT	Concentration+	Toluene-	CMR	LCI	R-value
				calib. substances ≥ 1 µg/m ³ uncalib. substances ≥ 1 µg/m ³ DNPH ≥ 2 µg/m ³	equivalent			
			[min]	[µg/m ³]	[µg/m ³]		AgBB 2021	
	Sesquiterpene*		21.71	2	< 5			

+ identified and calibrated substances, substance specific calculated

++ Classification according to Regulation (EG) N° 1272/2008: Categories 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: Kategorie III1 and III2

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

Carcinogenic, mutagenic and reproductive toxic components*	Concentration after 7 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	< 0.77
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	< 0.77

TVOC, Total volatile organic compounds	Concentration after 7 days [µg/m³]	SERa [µg/(m² · h)]
Sum of VOC according to DIN EN 16516	15	12
Sum of VOC according to AgBB 2021	15	12
Sum of VOC according to eco-INSTITUT-Label	34	26
Sum of VOC according to ISO 16000-6	37	28

TSVOC, Total semi volatile organic compounds	Concentration after 7 days [µg/m³]	SERa [µg/(m² · h)]
Sum of SVOC according to DIN EN 16516	< 5	< 3.9
Sum of SVOC without LCI according to AgBB 2021	< 5	< 3.9
Sum of SVOC without LCI according to eco-INSTITUT-Label	< 1	< 0.77
Sum of SVOC with LCI according to AgBB 2021	< 5	< 3.9

TWOC, Total very volatile organic compounds	Concentration after 7 days [µg/m³]	SERa [µg/(m² · h)]
Sum of VVOC according to AgBB 2021	< 5	< 3.9
Sum of VVOC according to eco-INSTITUT-Label	4	3.1

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

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

Other sums of VOC	Concentration after 7 days [µg/m³]	SERa [µg/(m² · h)]
VOC without LCI according to AgBB 2021 (sum)	16	12
VOC without LCI according to eco-INSTITUT-Label (sum)	21	16
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)	8	6.2
Sensitising compounds with the following categorisations: DFG (MAK list): Category IV; Regulation (EC) No. 1272/2008: skin sensitising, respiratory sensitising; TRGS 907 (sum)	2	1.5
Bicyclic Terpenes (sum)	< 1	< 0.77
C9 - C14 Alkanes / Isoalkanes as dekane-equivalent (sum)	< 1	< 0.77
C4 - C11 Aldehydes, acyclic, aliphatic (sum)	< 2	< 1.5
C9 - C15 Alkylated benzenes (sum)	< 1	< 0.77
Cresols (sum)	< 1	< 0.77

Risk value for assessment of LCI	R-value
R-value according to eco-INSTITUT-Label	0.05
R-value according to AgBB 2021	0.00
R-value according to Belgian regulation	0.00
R-value according to EU-LCI	0.00

Note:

Due to different requirements in the respective guidelines, the calculation of TVOC, TVOC, 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.



1.3 Carbon disulfide (CS₂, test chamber)

Test parameter:

Carbon disulfide (CS₂)

Test method:

Analytics: | DIN ISO 16000-6:2012-11
Limit of quantification: | 1 µg/m³

Test result:

Internal sample number: | 57337-A002

Parameter	Measurement time [days]	Concentration (test chamber) [µg/m ³]
Carbon disulfide CS ₂	2	2

1.4 Nitrosamines (test chamber)^{†#}

Test parameter:

Nitrosamines

Test method:

Analytics:

DGUV Information 213-523
(formerly BGI/GUV-I 505-23 respectively ZH1/120.23)
Determination of Nitrosamines

Test result:

Internal sample number	Measurement time [days]	Parameter	Concentration (Test chamber) [ng/m ³]	Limit of quantification [ng/m ³]
57337-A002	2	N-Nitrosodimethylamine (NDMA)	< q.l.	20
		N-Nitrosomethylethylamine (NMEA)	< q.l.	20
		N-Nitrosodiethylamine (NDEA)	< q.l.	20
		N-Nitrosodiisopropylamine (NDIPA)	< q.l.	20
		N-Nitrosodiisobutylamine (NDIBA)	< q.l.	20
		N-Nitrosodipropylamine (NDPA)	< q.l.	20
		N-Nitrosodibutylamine (NDBA)	< q.l.	20
		N-Nitrosopyrrolidine (NPYR)	< q.l.	20
		N-Nitrosopiperidine (NPIP)	< q.l.	20
		N-Nitrosomorpholine (NMOR)	< q.l.	20

< q.l. = Value below quantification limit

Remark: Concentrations below the limit of determination are between quantification limit and limit of determination and provide only qualitative evidence.

2 Polymer content[#]

Test parameter:

Relation between natural rubber (NR) and synthetic rubber (SBR)

Test method:

Analytics: | IR/ATR

Test result:

Internal sample number	Polymer content	[weight/%]
57337-A002	NR, with reference to the polymer content ^{1) 2) 3)}	100
	SBR, with reference to the polymer content	0

¹⁾ The averaged relative expanded measurement uncertainty ($k=2$) for for the content of NR is estimated to 34 %.

²⁾ If NR-content is below 5 %, the result will be 100 % SBR. Usually there will be no use of NR below 5 % in a mixture of NR and SBR.

³⁾ The content of NR is based on the assumption that polyisoprene in latex mattresses is always of natural origin.



3 Ash content[#]

Test parameter:

Ash content, filler content

Test method:

Analytics: | Thermogravimetry at 520 °C

Test result:

Internal sample number: | 57337-A002

Duplicate Determination	Applied sample amount	Mass aluminium shell	Mass aluminium shell + sample after heating	Mass ash	Ash content	Filler content
	[g]	[g]	[g]	[g]	[%]	[%]
Determination 1	1.8378	41.3011	41.3735	0.0724	3.9	0.0
Determination 2	1.7150	43.1595	43.2282	0.0687	4.0	0.0

Parameter	Content [M%]
Ash content (incl. zinc oxide), with reference to the sample	4.0
Filler content, with reference to the sample ¹⁾	0.0

¹⁾ The amount of filler is calculated as difference between the amount of ash and zinc oxide, assuming that the maximum of zinc oxide is 5 % of the total latex foam.

4 Organic halogenated compounds (AOX / EOX)^{†#}

Test parameter:

Absorbable organic halogenated compounds (AOX) and extractable organic halogenated compounds (EOX)

Test method:

Analytics:

AOX: elution with purest water in Soxleth-apparatus, mixing of 50 ml of the elution with 50 mg activated carbon, combustion of organic bound halogens in oxygen flow, micro coulometric determination of halogen content (analogous to DIN EN ISO 9562:2005-02)

EOX: clean up on silica gel, extraction with ethyl acetate, combustion of extract in oxygen flow, micro coulometric determination of halogen content (analogous to DIN 38414-17:2017-01)

Test result:

Internal sample number	Parameter	Content (Material) [mg/kg]	Limit of quantification [mg/kg]
57337-A001	AOX	< q.l.	0.5
	EOX	< q.l.	2

< q.l. = Value below quantification limit



5 Polycyclic aromatic hydrocarbons (PAH)^{†#}

Test parameter:

Polycyclic aromatic hydrocarbons (PAH)

Test method:

Analytics: | AfPS GS 2014:01 PAH

Test result:

Internal sample number	Parameter	CMR-Classification*	Content (Material) [mg/kg]	Limit of quantification [mg/kg]
57337-A001	Naphthalene	K2	< q.l.	0.5
	Acenaphthylene	-	< q.l.	0.2
	Acenaphthene	-	< q.l.	0.2
	Fluorene	-	< q.l.	0.2
	Phenanthrene	-	< q.l.	0.2
	Anthracene	-	< q.l.	0.2
	Fluoranthene	-	< q.l.	0.2
	Pyrene	-	< q.l.	0.2
	Benzo(a)anthracene	K1B	< q.l.	0.2
	Chrysene	K1B, M2	< q.l.	0.2
	Benzo(b)fluoranthene	K1B	< q.l.	0.2
	Benzo(j)fluoranthene	K1B	< q.l.	0.2
	Benzo(k)fluoranthene	K1B	< q.l.	0.2
	Benzo(a)pyrene	K1B, M1B, R1B	< q.l.	0.2
	Benzo(e)pyrene	K1B	< q.l.	0.2
	Indeno(1,2,3)pyrene	-	< q.l.	0.2
	Dibenz(ah)anthracene	K1B	< q.l.	0.2
	Benzo(ghi)perylene	-	< q.l.	0.2
Sum PAH		< q.l.		

*Classification according to Regulation (EG) N° 1272/2008

< q.l. = Value below quantification limit



6 Odour Testing

Test parameter:

Assessment of odour emissions

Test Method:

Analytics: Determination of odour as part of the eIL-test,
following VDA recommendation 270:2018

Test conditions

Test chamber	see 1 Emission analysis
Air sampling [days]	2
Probands	5
Therefrom female	1
Evaluation Acceptance	Continuous scale from +1 (not perceptible) to +6 (unbearable)

Test result:

Internal sample number: 57337-A002

	Evaluation
Odour intensity after 2 days (arithmetic mean)	2.8

Individual results:

Test person	Odour after 2 days [Note]
Test person 01	3.0
Test person 02	2.0
Test person 03	3.0
Test person 04	3.0
Test person 05	3.0

Cologne, 08/06/2022

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



Appendix

Sampling sheet




Sampling Sheet

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

57337-001

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

Customer*		Testing laboratory eco-INSTITUT Germany GmbH Schanzenstr. 6-20, Carlswerk 1.19 D-51063 Köln Tel. +49 (0)221 - 931245-0 Fax +49 (0)221 - 931245-33	
<input checked="" type="checkbox"/> Name of manufacturer Name of distributor (if different from customer)	Lien A Co., Ltd. 55/1A Khuong Viet Street, Phu Trung Ward, Tan Phu District, Ho Chi Minh City, Vietnam	Sampler* (Name, Company, Phone)	Le Huu Nghi - Tel. + 84 62924344 International Environment Co.Ltd
Name of test sample/ item* C. Fusion Latex Pillow		Product type (e.g. parquet, floor covering) Pillow	
Article number		Sample/ Batch* 080414019	
Model / Program / Series Oval Pillow		Production date of batch* 14/04/2022	
Sample were taken from	<input checked="" type="checkbox"/> current production <input type="checkbox"/> storage <input type="checkbox"/> other	Sampling date*	16/04/2022
Storage location		Storage conditions before sampling	<input checked="" type="checkbox"/> open <input type="checkbox"/> packaged
Packaging material			
Additional information, if applicable / Special issues Uncertainties, questions, possible negative effects through emissions at place of sampling - e.g. contaminations during production / storage			
Validation* Hereby the signer affirms the accuracy of the above-mentioned statements.			
Date (dd/mm/yyyy)	16/04/2022	Signature Sampler	 GIAM DOC Le Huu Nghi

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 Hees, Daniel Tigges
 HRB 17917 / USt-ID: DE 122653308 / Volksbank Rhein-Erft-Köln eG, IBAN: DE60370623651701900010, BIC: GENODE33HAN

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eco-INSTITUT Germany GmbH
Laborprüfung
Laboratory testing

Sampling Sheet

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

57337-002

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

Customer*		Testing laboratory eco-INSTITUT Germany GmbH Schanzenstr. 6-20, Carlswerk 1.19 D-51063 Köln Tel. +49 (0)221 - 931245-0 Fax +49 (0)221 - 931245-33	
<input checked="" type="checkbox"/> Name of manufacturer	Lien A Co., Ltd. 55/1A Khuong Viet Street, Phu Trung Ward, Tan Phu District, Ho Chi Minh City, Vietnam	Sampler* (Name, Company, Phone)	Le Huu Nghi - Tel. + 84 62924344 International Environment Co.Ltd
Name of distributor (if different from customer)		Sampling location*	35/10, 48 Street, 14 Ward, Go Vap District, Ho Chi Minh City, Vietnam
Name of test sample/ item*	Natural Latex mattress core	Product type (e.g. parquet, floor covering)	Mattress core
Article number		Sample/ Batch*	080402019
Model / Program / Series	Pincore	Production date of batch*	14/04/2022
Sample were taken from	<input checked="" type="checkbox"/> current production <input type="checkbox"/> storage <input type="checkbox"/> other	Sampling date*	16/04/2022
Storage location		Storage conditions before sampling	<input checked="" type="checkbox"/> open <input type="checkbox"/> packaged
Packaging material			
Additional information, if applicable / Special issues Uncertainties, questions, possible negative effects through emissions at place of sampling - e.g. contaminations during production / storage			
Validation* Hereby the signer affirms the accuracy of the above-mentioned statements.			
Date (dd/mm/yyyy)	16 10 4 1 2022	Signature Sampler	

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List of calibrated Volatile Organic Compounds (VOC)

Aromatic hydrocarbons (31)

Benzene
 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-Phenyloctane
 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
 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^{1,3}
 Acetaldehyde^{1,3}
 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)
Tetrachloromethane
1,2-Dichloroethane
1,1,1-Trichloroethane
2-Chloropropane
1,2,3-Trichloropropane
Trichloroethene
Tetrachloroethene
trans-1,3-Dichloropropene
cis-1,3-Dichloropropene
Chloroprene
1,3-Dichloro-2-propanol
Chlorobenzene
1,4-Dichlorobenzene
alpha-Chlorotoluene
alpha,alpha,alpha-Trichlorotoluene

Cyclic siloxanes (5)

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

Others (41)

1,4-Dioxane
1,2-Dibromoethane
2-Nitropropane
2,3-Dinitrotoluene
2,4-Dinitrotoluene
2,6-Dinitrotoluene
3,4-Dinitrotoluene²
o-Anisidine
o-Toluidine
4-Chloro-o-toluidine
5-Nitro-o-toluidine²
Acrylonitrile¹
2,2'-Azobisisobutyronitrile
Tetramethylsuccinonitrile
Azobenzene²
Caprolactam
Furan¹
2-Methylfuran
2-Pentylfuran
Methenamine
Triethylamine
2-Butanoxime
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
Formamide
Dimethylformamide (DMF)
Acetamide
N-Nitrosopyrrolidine
N-Methyl-2-pyrrolidone
N-Ethyl-2-pyrrolidone
N-Butyl-2-pyrrolidone
Aniline
4-Chloroaniline
2-Nitroaniline
Cyclohexyl isocyanate
p-Cresidine
Diethyl sulfate
Epichlorohydrin

1 WVOC

2 SVOC

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

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 16516:2020-10	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 ISO 16000-6:2012-11	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 16516:2020-10	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.