

LIEN A Co., Ltd.
55/1A Khuong Viet Street Phu Trung
Ward, Tan Phu District
Ho Chi Minh City, Vietnam
VN

Test Report No. 51380-001-002

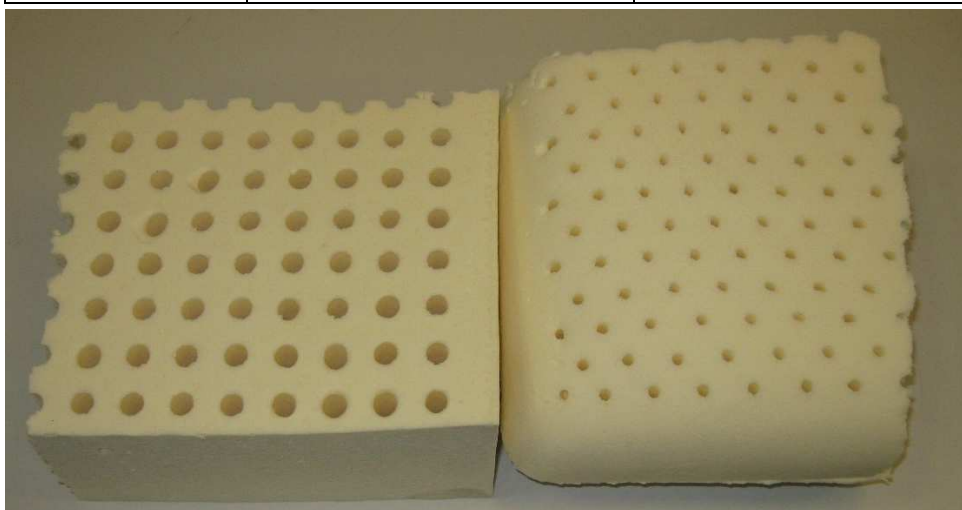
Test objective:	Evaluation according to eco-INSTITUT-Label-criteria
Sample description by client:	Latex mattress Pincore, Latex pillow Oval
Sampled by:	Lo Huu Nghi, International Environment Co. Ltd.
Date of sampling:	22.07.2016
Location of sampling:	at the client
Date of production:	19.07.2016
Date of arrival of sample:	02.08.2016
Test period:	02.08.2016 – 25.08.2016
Date of report:	26.08.2016
Number of pages of report:	23
Testing laboratory:	eco-INSTITUT Germany GmbH, Köln except ‡ subcontracted # outside accreditation
Test objective fulfilled:	✓

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Sample view

Internal Sample-no.	Description by customer	Condition upon delivery	Type of sample
A001	Latex mattress Pincore - Size: 90 x 100 x 10 cm D 95	without objection	Latex mattress
A002	Latex pillow Oval - Size: 40 x 60 D 55	without objection	Latex pillow



A001-A002: Latex mattress Pincore + Latex pillow Oval

Remark: The test result referred to the submitted test sample exclusively. The validity of the report is three years at most and will end immediately at any alternation of material composition or in manufacturing process. Publishing in parts requires authorisation.

Evaluation

The product **Latex mattress Pincore and the Latex pillow Oval** were submitted to laboratory tests on behalf of **LIEN A Co., Ltd.** for an ecological product examination according to the eco-INSTITUT-Label test criteria "mattresses/beddings" (status: June 2016).

The results documented in the test report were evaluated as follows.

P11 Complete mattress				
Test parameters	Result		Limit Value	Within limits [yes/no]
Emission test				
Measurement time: 2 days after test chamber loading				
TVOC (total volatile organic compounds including SVOC with LCI)	<	1 µg/m ³	≤ 400 µg/m ³	yes
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: K1, K2, M1, M2, R1, R2; IARC: Group 1 and 2A; DFG (MAK list): Categories III1, III2 (Sum)	<	1 µg/m ³	≤ 1 µg/m ³	yes
Formaldehyde	<	2 µg/m ³	≤ 24 µg/m ³	yes
Acetaldehyde	<	2 µg/m ³	≤ 24 µg/m ³	yes
Measurement time: 7 days after test chamber loading				
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: K1, K2, M1, M2, R1, R2; IARC: Group 1 and 2A; DFG (MAK list): Categories III1, III2 (Sum)	<	1 µg/m ³	≤ 1 µg/m ³	yes
CMR 2: CMR: VOC (incl. VVOC and SVOC) with the following categorisations: Regulation (EC) No. 1272/2008: Category Carc. 2, Muta. 2, Repr. 2; TRGS 905: K3; IARC: Group 2B; DFG (MAK list): Category III3 (Sum)	<	1 µg/m ³	≤ 50 µg/m ³	yes
TVOC (total volatile organic compounds including SVOC with LCI)		14 µg/m ³	≤ 200 µg/m ³	yes
TSVOC (total semi-volatile organic compounds)	<	1 µg/m ³	≤ 40 µg/m ³	yes
VOC (Sum) without LCI		1 µg/m ³	≤ 100 µg/m ³	yes
Sensitising compounds with the following categorisations: DFG (MAK list): Category IV, German Federal Institute for Risk Assessment lists: Cat A, TRGS 907 (Sum)	<	1 µg/m ³	≤ 100 µg/m ³	yes

Remark: The test result referred to the submitted test sample exclusively. The validity of the report is three years at most and will end immediately at any alternation of material composition or in manufacturing process. Publishing in parts requires authorisation.

Test parameters	Result	Limit Value	Within limits [yes/no]
Bicyclic terpenes (Sum)	< 1 µg/m ³	≤ 200 µg/m ³	yes
C9 – C14 Alkanes / Isoalkanes (Sum)	11 µg/m ³	≤ 200 µg/m ³	yes
C4 – C11 Aldehydes, acyclic, aliphatic (Sum)	< 2 µg/m ³	≤ 100 µg/m ³	yes
C6 – C15 Alkyl benzenes (Sum)	< 1 µg/m ³	≤ 100 µg/m ³	yes
Cresols (Sum)	< 1 µg/m ³	≤ 5 µg/m ³	yes
VOC (individual substances):			
Styrene	< 1 µg/m ³	≤ 10 µg/m ³	yes
Phenole	< 1 µg/m ³	≤ 20 µg/m ³	yes
Methylisothiazolinone (MIT)	< 1 µg/m ³	≤ 1 µg/m ³	yes
Benzaldehyde	< 1 µg/m ³	≤ 20 µg/m ³	yes
2-Ethyl-1-hexanol	< 1 µg/m ³	≤ 100 µg/m ³	yes
Ethylen glycol monobutylether	< 1 µg/m ³	≤ 100 µg/m ³	yes
2-Hexoxyethanol	< 1 µg/m ³	≤ 100 µg/m ³	yes
Methylisobutylketone	< 1 µg/m ³	≤ 100 µg/m ³	yes
2-Butoxyethylacetate	< 1 µg/m ³	≤ 200 µg/m ³	yes
R-Value	0.01	≤ 1	yes

P11 Complete mattress			
Test parameters	Result	Limit Value	Within limits [yes/no]
Nitrosamines (only latex products)	A001 A002 not determinable	≤ 300 ng/m ³	yes
Disulphide (only latex products)	A001 A002 7 µg/m ³	≤ 50 µg/m ³	yes

P31 Upholstery / padding materials: Latex			
Test parameter	Result / Emission	Limit value	Within limits [yes/no]
Content analysis			
Polymer content (NR: natural rubber)	A002 100 % NR	not applicable	not applicable
Polymer content (NR: natural rubber)	A001 100 % NR	not applicable	not applicable
Filler content	A002 0 %	≤ 5 %	yes

Remark: The test result referred to the submitted test sample exclusively. The validity of the report is three years at most and will end immediately at any alternation of material composition or in manufacturing process. Publishing in parts requires authorisation.

Summary evaluation

The **Latex mattress Pincore** and the **Latex pillow Oval** were submitted to an ecological product examination on behalf of **LIEN A Co., Ltd.** for the acquisition of the eco-INSTITUT-Label. The eco-INSTITUT-Label criteria were successfully fulfilled.

As a result of the successful ecological product examination the

eco-INSTITUT-Label



is awarded for the product/s:

Latex mattress Pincore
Latex pillow Oval

for a period of two years.

Certification number	ID 0310 - 12246 - 001
Test report Number	51380-001-002
Validity	06/2016

After expiration of two years it is possible to acquire the eco-INSTITUT-Label for another two year period. For this a pre-certification review and a laboratory test will be accomplished according to the latest eco-INSTITUT-Label test criteria.

Cologne, 26.08.2016



Vanessa Laumann, Dipl.-Chem.
(Project manager)

Laboratory report

1 Emission analysis

Test method

prEN 16516	Testing and evaluation of the release of dangerous substances; determination of emissions into indoor air
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Preparation of test sample

Date:	08.08.2016
Pre-treatment:	not applicable
Masking of backside:	no
Masking of edges:	no
Relationship of unmasked edges to surface:	not applicable
Loading:	related to area
Dimensions:	(21.5 cm x 19 cm x 10 cm) + (19.5 cm x 19.5 cm x 11 cm)

Test chamber conditions according to DIN ISO 16000-9

Chamber volume:	0.250 m ³
Temperature:	23 °C
Relative humidity:	50 %
Air pressure:	normal
Air:	cleaned
Air change rate:	1.0 h ⁻¹
Air velocity:	0.3 m/s
Loading:	1.3 m ² /m ³
Specific air flow rate:	0.769 m ³ /m ² · h
Air sampling:	2 and 7 days after test chamber loading

Analytics

Aldehydes and Ketones	DIN ISO 16000-3
Limit of determination:	2 µg/m ³
Volatile Organic Compounds	DIN ISO 16000-6
Limit of determination:	1 µg/m ³
Note for analysis:	not specified

1.1 Sample A001-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:

Sample: A001: Latex mattress Pincore - Size: 90 x 100 x 10 cm D 95
 A002: Latex pillow Oval - Size: 40 x 60 D 55

No.	Substance	CAS No.	RT [min]	Concentration+ (test chamber air) Substances $\geq 1 \mu\text{g}/\text{m}^3$ 2 days [$\mu\text{g}/\text{m}^3$]	Toluene- equivalent Substances $\geq 5 \mu\text{g}/\text{m}^3$ 2 days [$\mu\text{g}/\text{m}^3$]	CMR Classi- fica- tion++	LCI AgBB 2015 [$\mu\text{g}/\text{m}^3$]	R- value
2	Aliphatic hydrocarbons (n-, iso- and cyclo-)							
2-10.1	n-Nonane	111-84-2	10.79	1			6000	0.00
2-10.2	n-Decane	124-18-5	13.03	2			6000	0.00
2-10.3	n-Undecane	1120-21-4	15.18	1			6000	0.00
2-10.4	n-Dodecane	112-40-3	17.24	2			6000	0.00
7	Aldehyde							
7-7	Nonanal	124-19-6	15.33	2			900	0.00
7-19	Benzaldehyde	100-52-7	12.54	1			90	0.01
8	Ketones							
8-10	Acetone	67-64-1		4			1200	0.00
9	Acids							
9-1	Acetic acid	64-19-7	4.53	2			1250	0.00
10	Esters							
10-11	1 Butyl acetate	123-86-4	8.74	1			4800	0.00

Remark: The test result referred to the submitted test sample exclusively. The validity of the report is three years at most and will end immediately at any alternation of material composition or in manufacturing process. Publishing in parts requires authorisation.

No.	Substance	CAS No.	RT [min]	Concentration+ (test chamber air) Substances $\geq 1 \mu\text{g}/\text{m}^3$ 2 days [$\mu\text{g}/\text{m}^3$]	Toluene- equivalent Substances $\geq 5 \mu\text{g}/\text{m}^3$ 2 days [$\mu\text{g}/\text{m}^3$]	CMR Classi- fica- tion++	LCI AgBB 2015 [$\mu\text{g}/\text{m}^3$]	R- value
13	Other identified substances in addition to LCI list							
	Benzothiazole	95-16-9	18.71	1				
2-10	2,2,4,6,6-Pentamethyl- heptane	13475-82- 6	13.01	3			6000	0.00
	*		11.61	1				
2-10	Other saturated ali- phatic hydrocarbons C9 - C16*	--	13.7- 16.0	15	15		6000	0.00

+ 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: K1 and K2, M1 and M2, R1 and R2, IARC: Group 1 and 2A, DFG MAK-list: Kategorie III1 and III2

* unidentified substance, calculated as toluene equivalent

Carcinogenic, mutagenic and reproductive toxic components	Concentration after 2 days [µg/m³]	SER_a [µg/m²h]
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: K1, K2, M1, M2, R1, R2; 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 (Sum)	< 1	< 0.77

TVOC, Total volatile organic compounds	Concentration after 2 days [µg/m³]	SER_a [µg/m²h]
Sum of VOC according to prEN 16516	15	12
Sum of VOC according to AgBB 2015 / DIBt	15	12
Sum of VOC according to eco-INSTITUT-Label	32	25
Sum of VOC according to ISO 16000-6	50	39

TSVOC, Total semi volatile organic compounds	Concentration after 2 days [µg/m³]	SER_a [µg/m²h]
Sum of SVOC according to prEN 16516	< 5	< 3.85
Sum of SVOC without LCI according to AgBB 2015 / DIBt	< 5	< 3.85
Sum of SVOC without LCI according to eco-INSTITUT-Label	< 1	< 0.77
Sum of SVOC with LCI according to AgBB 2015 / DIBt	< 5	< 3.85

TVVOC, Total very volatile organic compounds	Concentration after 2 days [µg/m³]	SER_a [µg/m²h]
Sum of VVOC according to AgBB 2015 / DIBt and Belgian regulation	< 5	< 3.85
Sum of VVOC according to eco-INSTITUT-Label	4	3.1

Remark: The test result referred to the submitted test sample exclusively. The validity of the report is three years at most and will end immediately at any alternation of material composition or in manufacturing process. Publishing in parts requires authorisation.

Other sums of VOC	Concentration after 2 days [µg/m³]	SER _a [µg/m²h]
VOC without LCI according to AgBB/DIBt and Belgian regulation (Sum)	< 5	< 3.85
VOC without LCI according to eco-INSTITUT-Label (Sum)	2	1.5
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: K3; IARC: Group 2B; DFG (MAK list): Category III3 (Sum)	< 1	< 0.77
Sensitising compounds with the following categorisations: DFG (MAK list): Category IV, German Federal Institute for Risk Assessment lists: Cat A, TRGS 907 (Sum)	< 1	< 0.77
Bicyclic Terpenes	< 1	< 0.77
C9 - C14: Alkanes / Isoalkanes as dekane-equivalent (Sum)	24	18
C4-C11 Aldehydes, acyclic, aliphatic (Sum)	2	1.5
C9-C15 Alkylated benzenes (Sum)	< 1	< 0.77
Kresoles (Sum)	< 1	< 0.77

Risk value for assessment of LCI	R-value
R-value according to eco-INSTITUT-Label	0.02
R-value according to AgBB 2015 / DIBt	0.00
R-value according to Belgian regulation	0.00
R-value according to AFSSET	0.00

Remark: The test result referred to the submitted test sample exclusively. The validity of the report is three years at most and will end immediately at any alternation of material composition or in manufacturing process. Publishing in parts requires authorisation.

1.2 Sample A001-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:

Sample: A001: Latex mattress Pincore - Size: 90 x 100 x 10 cm D 95
 A002: Latex pillow Oval - Size: 40 x 60 D 55

No.	Substance	CAS No.	RT [min]	Concentration+ (test chamber air) Substances $\geq 1 \mu\text{g}/\text{m}^3$ after 7 days [$\mu\text{g}/\text{m}^3$]	Toluene-equivalent Substances $\geq 5 \mu\text{g}/\text{m}^3$ after 7 days [$\mu\text{g}/\text{m}^3$]	CMR Classifi- cation++	LCI AgBB 2015 [$\mu\text{g}/\text{m}^3$]	R-value
2	Aliphatic hydrocarbons (n-, iso- and cyclo-)							
2-10.4	n-Dodecane	112-40-3	17.23	1			6000	0.00
8	Ketones							
8-10	Acetone	67-64-1		5			1200	0.00
9	Acids							
9-1	Acetic acid	64-19-7	4.52	1			1250	0.00
10	Esters							
10-11	1 Butyl acetate	123-86-4	8.73	1			4800	0.00
13	Other identified substances in addition to LCI list							
	Benzothiazole	95-16-9	18.69	1				
2-10	Other saturated aliphatic hydrocarbons C9 - C16*	--	13.7-16.0	10	10		6000	0.00

+ 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: K1 and K2, M1 and M2, R1 and R2, IARC: Group 1 and 2A, DFG MAK-list: Kategorie III1 and III2

* unidentified substance, calculated as toluene equivalent

Remark: The test result referred to the submitted test sample exclusively. The validity of the report is three years at most and will end immediately at any alternation of material composition or in manufacturing process. Publishing in parts requires authorisation.

Carcinogenic, mutagenic and reproductive toxic components	Concentration after 7 days [µg/m³]	SER_a [µg/m²h]
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: K1, K2, M1, M2, R1, R2; 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 (Sum)	< 1	< 0.77

TVOC, Total volatile organic compounds	Concentration after 7 days [µg/m³]	SER_a [µg/m²h]
Sum of VOC according to prEN 16516	10	7.7
Sum of VOC according to AgBB 2015 / DIBt	10	7.7
Sum of VOC according to eco-INSTITUT-Label	14	11
Sum of VOC according to ISO 16000-6	20	15

TSVOC, Total semi volatile organic compounds	Concentration after 7 days [µg/m³]	SER_a [µg/m²h]
Sum of SVOC according to prEN 16516	< 5	< 3.85
Sum of SVOC without LCI according to AgBB 2015 / DIBt	< 5	< 3.85
Sum of SVOC without LCI according to eco-INSTITUT-Label	< 1	< 0.77
Sum of SVOC with LCI according to AgBB 2015 / DIBt	< 5	< 3.85

TVVOC, Total very volatile organic compounds	Concentration after 7 days [µg/m³]	SER_a [µg/m²h]
Sum of VVOC according to AgBB 2015 / DIBt and Belgian regulation	5	3.9
Sum of VVOC according to eco-INSTITUT-Label	5	3.9

Remark: The test result referred to the submitted test sample exclusively. The validity of the report is three years at most and will end immediately at any alternation of material composition or in manufacturing process. Publishing in parts requires authorisation.

Other sums of VOC	Concentration after 7 days [µg/m³]	SER_a [µg/m²h]
VOC without LCI according to AgBB/DIBt and Belgian regulation (Sum)	< 5	< 3.85
VOC without LCI according to eco-INSTITUT-Label (Sum)	1	0.77
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: K3; IARC: Group 2B; DFG (MAK list): Category III3 (Sum)	< 1	< 0.77
Sensitising compounds with the following categorisations: DFG (MAK list): Category IV, German Federal Institute for Risk Assessment lists: Cat A, TRGS 907 (Sum)	< 1	< 0.77
Bicyclic Terpenes	< 1	< 0.77
C9 - C14: Alkanes / Isoalkanes as dekane-equivalent (Sum)	11	8.5
C4-C11 Aldehydes, acyclic, aliphatic (Sum)	< 2	< 0.77
C9-C15 Alkylated benzenes (Sum)	< 1	< 0.77
Kresoles (Sum)	< 1	< 0.77

Risk value for assessment of LCI	R-value
R-value according to eco-INSTITUT-Label	0.01
R-value according to AgBB 2015 / DIBt	0.00
R-value according to Belgian regulation	0.00
R-value according to AFSSET	0.00

Note: Due to different requirements in the respective guidelines, the calculation of TVOC, TVVOC, TSVOC and R-value may result in different values.

Remark: The test result referred to the submitted test sample exclusively. The validity of the report is three years at most and will end immediately at any alternation of material composition or in manufacturing process. Publishing in parts requires authorisation.

1.3 Nitrosamines (test chamber)‡

Test parameter:

Nitrosamines

Test method:

Analytics: | BGI 505-23

Test result:

Sample: | A002: Latex pillow Oval - Size: 40 x 60 D 55
| A001: Latex mattress Pincore - Size: 90 x 100 x 10 cm D 95

Parameter	Limit of determination [ng/m ³]	Concentration (Test chamber) [ng/m ³]
N-Nitrosodimethylamine (NDMA)	100	< 100
N-Nitrosomethylethylamine (NMEA)	100	< 100
N-Nitrosodiethylamine (NDEA)	100	< 100
N-Nitrosodiisopropylamine (NDIPA)	100	< 100
N-Nitrosodipropylamine (NDPA)	100	< 100
N-Nitrosodibutylamine (NDBA)	100	< 100
N-Nitrosopyrrolidine (NPYR)	100	< 100
N-Nitrosopiperidine (NPIP)	100	< 100
N-Nitrosomorpholine (NMOR)	100	< 100

Remark: The test result referred to the submitted test sample exclusively. The validity of the report is three years at most and will end immediately at any alternation of material composition or in manufacturing process. Publishing in parts requires authorisation.

1.4 Carbon disulfide (CS₂, test chamber)

Test parameter:

Carbon disulfide (CS₂)

Test method:

Analytics: | DIN ISO 16000-6
Limit of determination: | 1 µg/m³

Test result:

Sample	Parameter	Measurement time [days]	Concentration (test chamber) [µg/m ³]
A001 A002	Carbon disulfide CS ₂	2	7

2 Polymer content#

Test parameter:

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

Test method:

Analytics: | IR/ATR

Test result:

Sample: | A002: Latex pillow Oval - Size: 40 x 60 D 55

Polymer content	[weight/%]
NR, with reference to the polymer content ^{1) 2)}	100
SBR, with reference to the polymer content	0

¹⁾ 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.

²⁾ The content of NR is based on the assumption that polyisoprene in latex mattresses is always of natural origin.

Test result:

Sample: | A001: Latex mattress Pincore - Size: 90 x 100 x 10 cm D 95

Polymer content	[weight/%]
NR, with reference to the polymer content ^{1) 2)}	100
SBR, with reference to the polymer content	0

¹⁾ 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.

²⁾ 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

Test result:

Sample: | A002: Latex pillow Oval

Parameter	[weight/%]
Ash content (incl. zinc oxide), with reference to the sample	3.5
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.

Cologne, 26.08.2016



Michael Stein, Dipl.-Chem.
(Deputy Technical Manager)

Appendix

I Sampling Sheet

Produktprüfung Product testing Zertifizierung Certification Beratung Consulting			
eco-INSTITUT-Label			
Sampling Sheet*			
Testing laboratory	eco-INSTITUT Germany GmbH Schanzenstr. 6-20, D-51063 Cologne Tel. +49 (0)221 - 931245-0 Fax +49 (0)221 - 931245-33	Sampler (Name, Company, Phone)	Le Huu Nghi International Environment Co.Ltd 36/10, 18 Street, 14 Ward, Go Vap District, Ho Chi Minh City, Vietnam Tel. + 84 82924344
Name of manufacturer / distributor at place of sampling (Address / Stamp)	Lien A Co., Ltd. 55/1A Khuong Viet Street, Phu Trung Ward, Tan Phu District, Ho Chi Minh City, Vietnam	Customer/ Invoice recipient (if different from manufacturer)	
Product name	Latex mattress core	Product type (e.g. parquet, floor covering)	Mattress core
Model / programme / series	Pincore	Batch	020719001
Article number		Production date of batch	19.07.15
Samples are taken from	<input checked="" type="checkbox"/> current production <input type="checkbox"/> storage	Sampling date	22.07.16
Storage location before sampling	<input checked="" type="checkbox"/> production <input type="checkbox"/> storage <input type="checkbox"/> other:	Sampling time	16:00
Storage location:		Storage conditions before sampling	<input checked="" type="checkbox"/> open <input type="checkbox"/> packaged
		Packaging material:	
Special features (possible negative effects through emissions at place of sampling (e.g. benzine, exhaust fumes), uncertainties, questions etc.)			
Validation Hereby the signer affirms the accuracy of the above-mentioned statements. The sample was chosen, sampled and packaged according to the sampling guidelines. Date: 22.07.16			
* Please take one sampling sheet for each sample! The sampling instruction must be strictly maintained.			
Order (Please insert quote number, or - if not available, please enter the desired analysis)			
eco-INSTITUT Germany GmbH / Eberswalderstr. 6-20 / D-51063 Cologne / Germany Tel. +49 221 931245-0 / Fax +49 221 931245-33 / eco@institut.de / www.institut.de			

Remark: The test result referred to the submitted test sample exclusively. The validity of the report is three years at most and will end immediately at any alternation of material composition or in manufacturing process. Publishing in parts requires authorisation.

II 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 prEN 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
TVOC according to AgBB/DIBt	Sum of all identified and calibrated VOC $\geq 5 \mu\text{g}/\text{m}^3$, SVOC $\geq 5 \mu\text{g}/\text{m}^3$ with LCI and not calibrated VOC $\geq 5 \mu\text{g}/\text{m}^3$ calculated as toluene equivalent
TVOC according to eco-INSTITUT-Label	Sum of all identified and calibrated VOC $\geq 1 \mu\text{g}/\text{m}^3$, SVOC $\geq 5 \mu\text{g}/\text{m}^3$ with LCI and not calibrated VOC $\geq 1 \mu\text{g}/\text{m}^3$ calculated as toluene equivalent
TVOC according to ISO 16000-6	Total area of chromatogram in the retention range C ₆ to C ₁₆ , calculated as toluene equivalent
TVOC without LCI according to AgBB/DIBt and Belgian regulation	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: K1 and K2, M1 and M2, R1 and R2 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/DIBt and Belgian regulation	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 to C ₂₂
TSVOC	Total semi volatile organic compounds
TSVOC according to prEN 16516	Sum of all SVOC in the retention range C ₁₆ to C ₂₂ , calculated as toluene equivalent
TSVOC without LCI according to AgBB/DIBt	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/DIBt	Sum of all identified and calibrated SVOC $\geq 5 \mu\text{g}/\text{m}^3$ with LCI
SER	Specific emission rate (see appendix IV)

Remark: The test result referred to the submitted test sample exclusively. The validity of the report is three years at most and will end immediately at any alternation of material composition or in manufacturing process. Publishing in parts requires authorisation.

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 and calibrated VOC $\geq 1 \mu\text{g}/\text{m}^3$ with LCI, established by the AgBB in 2015
R value according to AgBB 2015/DIBt	R value for all identified and calibrated VOC $\geq 5 \mu\text{g}/\text{m}^3$ with LCI, established by the AgBB in 2015
R value according to Belgian regulation	R value for all identified and calibrated VOC $\geq 5 \mu\text{g}/\text{m}^3$ with LCI, established by the Belgian regulation
R value according to AFSSET	R value for all identified and calibrated VOC $\geq 5 \mu\text{g}/\text{m}^3$ with LCI, established by ANSES (French National Agency on Food Safety, Environment, and Workplace Security)
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, calculated as toluene equivalent

III List of analysed Volatile Organic Compounds (VOC)

Aromatic hydrocarbons

Toluene
 Ethylbenzene
p-Xylene
m-Xylene
o-Xylene
 Isopropylbenzene
n-Propylbenzene
 1,3,5-Trimethylbenzene
 1,2,4-Trimethylbenzene
 1,2,3-Trimethylbenzene
 2-Ethyltoluene
 1-Isopropyl-4-methylbenzene
 1,2,4,5-Tetramethylbenzene
n-Butylbenzene
 1,3-Diisopropylbenzene
 1,4-Diisopropylbenzene
 Phenylacetone
 1-Phenyldecane²
 1-Phenylundecane²
 4-Phenylcyclohexene
 Styrene
 Phenylacetylene
 2-Phenylpropene
 Vinyltoluene
 Naphthalene
 Indene
 Benzene
 1-Methylnaphthalene
 2-Methylnaphthalene
 1,4-Dimethylnaphthalene

Saturated aliphatic substances

2-Methylpentane¹
 3-Methylpentane¹
n-Hexane
 Cyclohexane
 Methylcyclohexane
n-Heptane
n-Octane
n-Nonane
n-Decane
n-Undecane
n-Dodecane
n-Tridecane
n-Tetradecane
n-Pentadecane
 1-Butanol
 1-Pentanol
 1-Hexanol
n-Hexadecane
 Methylcyclopentane
 1,4-Dimethylcyclohexane

Terpenes

δ-3-Carene
 α-Pinene
 β-Pinene
 Limonene

Aliphatic alcohols and ether

1-Propanol¹
 2-Propanol¹
tert-Butanol
 Cyclohexanol
 2-Ethyl-1-hexanol
 2-Methyl-1-propanol
 1-Octanol
 4-Hydroxy-4-methyl-2-pentanone

1-Heptanol
 1-Nonanol
 1-Decanol
 1,4-Cyclohexandimethanol

Aromatic alcohols (phenols)

Phenol
 BHT (2,6-Di-*tert*-butyl-4-methylphenol)
 Benzyl alcohol
 Cresols

Glycols, Glycol ether, Glycol ester

Propyleneglycol (1,2-Dihydroxypropane)
 Ethyleneglycol (Ethandiol)
 Ethylene glycol monobutyl ether
 Diethylene glycol
 Diethylene glycol-monobutyl ether
 2-Phenoxyethanol
 Ethylene carbonate
 1-Methoxy-2-propanol
 Texanol
 Glycolic acid butylester
 Butyl diglycol acetate
 Dipropylene glycol monomethyl ether
 2-Methoxyethanol
 2-Ethoxyethanol
 2-Propoxyethanol
 2-Methylethoxyethanol
 2-Hexoxyethanol
 1,2-Dimethoxyethane
 1,2-Diethoxyethane
 2-Methoxyethyl acetate
 2-Ethoxyethyl acetate
 2-(2-Hexoxyethoxy)ethanol
 1-Methoxy-2-(2-methoxyethoxy)ethane
 Propylene glycol diacetate
 Dipropylene glycol
 Dipropylene glycol monomethylether acetate
 Dipropylene glycol *n*-propyl ether
 Di(propylene glycol) *tert*-butylether
 1,4-Butanediol
 Tri(propylene glycol) methyl ether
 Triethylene glycol dimethyl ether
 Propylene glycol dimethyl ether
 TXIB (Texanol isobutyrate)
 Ethyldiglycol
 Dipropylene glycol dimethylether
 Propylene carbonate
 Hexyleneglycol
 3-Methoxy-1-butanol
 Propylene glycol *n*-propyl ether
 Propylene glycol *n*-butyl ether
 Diethylene glycol phenyl ether
 Neopentyl glycol
 Diethylene glycol methyl ether
 1-Ethoxy-2-propanol
tert-Butoxy-2-propanol

Aldehydes

Butanal^{1,3}
 Pentanal³
 Hexanal
 Heptanal
 2-Ethylhexanal
 Octanal

Nonanal
 Decanal
 2-Butenal³
 2-Pentenal³
 2-Hexenal
 2-Heptenal
 2-Undecenal
 Furfural
 Glutaraldehyde
 Benzaldehyde
 Acetaldehyde^{1,3}
 Formaldehyde^{1,3}
 Propenal^{1,3}
 Propenal^{1,3}
 Isobutenal³
 2-Octenal
 2-Nonenal
 2-Decenal

Ketones

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

Acids

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

Esters and Lactones

Methylacetate¹
 Ethyl acetate¹
 Vinyl acetate¹
 Isopropyl acetate
 Propyl acetate
 2-Methoxy-1-methylethyl acetate
n-Butyl formate
 Methylmethacrylate
 Isobutylacetate
 1-Butyl acetate
 2-Ethylhexyl acetate
 Methyl acrylate
 Ethyl acrylate
n-Butyl acrylate
 2-Ethylhexyl acrylate
 Adipic acid dimethylester
 Fumaric acid dibutylester
 Succinic acid dimethylester
 Glutaric acid dimethylester
 Hexandioldiacrylate
 Maleic acid dibutylester
 Butyrolactone
 Glutaric acid diisobutylester
 Succinic acid diisobutylester
 Dimethylphthalate
 Diethylphthalate²

Dipropylphthalate²
 Dibutylphthalate²
 Diisobutylphthalate²
 Texanol
 Dipropylene glycoldiacrylate

Chlorinated hydrocarbons

Tetrachlorethene
 1,1,1-Trichlorethane
 Trichlorethene
 1,4-Dichlorbenzene

Others

1,4-Dioxane
 Caprolactam
N-Methyl-2-pyrrolidone
 Octamethylcyclotetrasiloxane
 Hexamethylcyclotrisiloxane
 Methenamine
 2-Butanonoxime
 Triethyl phosphate
 5-Chlor-2-methyl-4-isothiazolin-3-one
 2-Methyl-4-isothiazolin-3-one (MIT)
 Triethylamine
 Decamethylcyclopentasiloxane
 Dodecamethylcyclohexasiloxane
 Tetrahydrofuran (THF)
 1-Decene
 1-Octene
 2-Pentylfuran
 Isophorone
 Tetramethyl succinonitrile
 Dimethylformamide (DMF)
 Tributyl phosphate
N-Ethyl-2-pyrrolidone
 Aniline
 4-Vinylcyclohexene

1 VVOC

2 SVOC

3 Analysis according to DIN ISO 16000-3

IV 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 with an air flow rate of 100 mL/min for Tenax and approx. 100 L with an air flow rate of 0.8 L/min for DNPH (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.

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 toluene signal.

The concentrations of substances that have been determined are corrected based on the recovery rate for an internal standard (d8 toluene). Identification and quantification of the substances is limited to 1 µg per m³ for substances adsorbed on Tenax and 2 µg/m³ for DNPH-derivatized substances (limit of quantification).

Quality assurance

The eco-INSTITUT Germany GmbH is granted flexible scope of accreditation pursuant to DIN EN ISO/IEC 17025. 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 prEN 16516. 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.

V 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.