



Produktprüfung
Zertifizierung
Qualitätssicherung

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Appraisal for the eco-INSTITUT-Label



**100 % Natural Latexfoam
Mattress Block**

LATEX GREEN Company (PVT) Ltd.

Test Report Nr. 19633



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Test Report No. 19633

Client:	LATEX GREEN Company (PVT) Ltd.
Sample description by client:	100 % Natural Latexfoam
Sample no.:	19633
Type of sample:	100% Natural Latex Foam / Mattress Block
Sampled by:	Client
Date of sampling:	05 September 2008
Location of sampling:	LATEX GREEN Company (PVT) Ltd., Avissawella
Date of production:	03 September 2008
Date of arrival of sample:	12 September 2008
Date of report:	08 October 2008
Number of pages of report:	20
Test parameter:	see table of contents
Testing laboratory:	eco-INSTITUT GmbH, Cologne * external laboratory



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Test report

Complete mattress

1 Emission test

1.1 Volatile organic compounds (VOC)

Definition of terms:

VOC (volatile organic compounds)	All individual materials with a concentration $\geq 0,001$ mg/m ³ in retention range C ₆ (n-Hexane) to C ₁₆ (n-Hexadecane) Substances refer to NIK lists / AgBB (DIBt) Sum of all individual substances in retention range C ₆ to C ₁₆ .
TVOC (total volatile organic compounds)	All individual substances with the following categories: Directive 67/548 EC: Carc. Cat.1, 2; Mut. Cat.1, 2; Repr. Cat.1, 2 IARC: Group 1, 2A DFG (MAK lists): Category III1, III2
CMR VOC (carcenogenic, mutagenic, reproduction toxic VOC)	All individual substances with concentration $\geq 0,001$ mg/m ³ in retention range $< C_6$
VVOC (very volatile organic compounds)	All individual materials $\geq 0,001$ mg/m ³ in retention range $> C_{16}$ (n-Hexadecane) to C ₂₂ (Docosane)
SVOC (semi-volatile organic compounds)	Sum of all SVOC in retention range $> C_{16}$ to C ₂₂ .
Total SVOC (total semi-volatile organic compounds)	Spectrum and retention time correlate with the calibrated substance
Identified and calibrated and substances (C _{id sub}), substance specific calculated	Suggestion from the spectrum library with high probability and/or allocation to a group of substances
Not identified substances calculated as toluene equivalent (C _{ni tol})	
SER	Specific emission rate (see appendix)



List of the analysed VOCs:

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
Phenyl octane
1-Phenyl decane**
1-Phenyl undecane**
4-Phenylcyclohexene
Styrene
Phenyl acetylene
2-Phenyl propene
Vinyl toluene
Naphthalene
Indene
Benzene

Saturated aliphatic substances

Hydrocarbons

2-Methyl pentane*

3-Methyl pentane*
n-Hexane
Cyclohexane
Methylcyclohexane
1,4-Dimethylcyclohexane
n-Heptane
n-Octane
n-Nonane
n-Decane
n-Undecane
n-Dodecane
n-Tridecane
n-Tetradecane
n-Pentadecane
n-Hexadecane
Methylcyclopentane
n-Heptane
Saturated aliphatic hydrocarbons up to C8
Saturated aliphatic hydrocarbons from C9

Terpenes

δ-3-Carene
α-Pinene
β-Pinene
Limonene

Aliphatic alcohols and ether

1-Propanol*
2-Propanol*
tert-Butanol
2-Methyl-1-propanol
1-Butanol
1-Pentanol
1-Hexanol
Cyclohexanol
2-Ethyl-1-hexanol
1-Octanol
4-Hydroxy-4-methyl-pentan-2-one
1-Heptanol
1-Nonanol
1-Decanol

Aromatic alcohols (phenols)

Phenol
BHT (2,6-di-tert-butyl-4-methylphenol)
Benzylalcohol

Glycols, Glycol ether, Glycol ester

Propylenglycol (1,2-Dihydroxypropane)
Ethylene glycol (Ethandiol)
Ethylene glycol monobutyl ether
Diethylene glycol
Diethylene glycol-monobutyl ether
2-Phenoxyethanol
Ethylene carbonate
1-Methoxy-2-propanol
Glycolic acid butyl ester
Texanol
Butyldiglycol acetate
Dipropylenglycol mono-methyl ether
2-Methoxyethanol
2-Ethoxyethanol
2-Propoxyethanol
2-Methylethoxyethanol
2-Hexoxyethanol
1,2-Dimethoxyethane
1,2-Diethoxyethane
2-Methoxyethyl acetate
2-Ethoxyethyl acetate
2-Butoxyethyl acetate
2-(2-Hexoxyethoxy)-ethanol
1-Methoxy-2-(2-methoxy-ethoxy)-ethane
Propylene glycol di-acetate
Dipropylene glycol
Dipropylene glycol monomethylether acetate
Dipropylene glycol mono-n-propylether
Dipropylene glycol mono-t-butylether
1,4-Butanediol
Tripropyleneglycolmonomethyl ether
Triethylene glycol dimethyl ether
1,2-Propylene glycol dimethyl ether
TXIB
Ethylidiglycol
Dipropylene glycol-dimethyl ether

Aldehyde

Butanal*
Pentanal
Hexanal
Heptanal
2-Ethylhexanal
Octanal
Nonanal
Decanal
2-Butenal
2-Pentenal
2-Hexenal
2-Heptenal
2-Octenal
2-Nonenal
2-Decenal
2-Undecenal
Furfural
Glutaraldehyde
Benzaldehyde
Acetaldehyde*
Propanal*

Ketones

Ethylmethylketone
3-Methyl-2-propanol
Methylisobutylketone
Cyclopentanone
Cyclohexanone
Acetone*
2-Methylcyclopentanone
2-Methylcyclohexanone
Acetophenone
1-Hydroxyacetone

Acids

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

Esters and Lactones

Methylacetate*
Ethyl acetate*

Vinyl acetate*
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 dimethyl ester
Fumaric acid dibutyl ester
Succinic acid dimethyl ester
Glutaric acid dimethyl ester

Hexandioldiacrylate

Maleic acid dibutyl ester
Butyrolactone
Dimethylphthalate

Chlorinated hydrocarbons

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

Others

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

* VVOC

** SVOC



Test method:

Preparation of test sample:	DIN EN ISO 16000-11	
	Pre-treatment:	n/a
	Masking of backside:	No
	Masking of edges:	No
	Relationship of open edges to the surface:	n/a
	Loading:	related to the surface
Test chamber conditions:	Dimensions:	16,2 cm x 16,2 cm x 17,0 cm
	DIN EN ISO 16000-9	
	Chamber volume:	0.125 m ³
	Temperature:	23°C
	Relative humidity:	50 %
	Air pressure:	Normal
	Air:	Cleaned
	Air exchange rate:	1 h ⁻¹
	Upstream air velocity:	0.3 m/s
	Loading:	1,3 m ² /m ³
	Specific air flow rate:	0,77 m ³ /m ² *h
	Air sampling:	2 days (CMR VOC) or 7 days after test chamber loading
Analytics:	DIN ISO 16000-6	
	Detection limit:	2 µg/m ³

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Measurement time 2 days after test chamber loading

1.1.1 CMR VOC_{2d}

Test parameter:

Carcinogenic, mutagenic and reproduction-toxic volatile organic compounds (CMR VOC), test chamber, air sampling 2 days after test chamber loading

Test result:

CMR VOCs were not detectable 2 days after test chamber loading.

1.1.2 VOC / TVOC_{2d}

Test parameter:

Volatile organic compounds (VOC), test chamber, air sampling 2 days after test chamber loading

Test result:

No.	Substance	CAS No.	Concentration (Test chamber air) [µg/m ³]
VOC_{2d}: Identified and calibrated substances in accordance with NIK list/AgBB, substance specific calculated (C_{id sub})			
1	Aromatic hydrocarbons		
1-1	Toluene	108-88-3	2
VOC_{2d}: Further identified and calibrated substances in accordance with NIK list/AgBB, substance specific calculated (C_{id sub})			
-	-	-	-
VOC_{2d}: Not identified substances calculated as toluene equivalent (c_{ni tol})			
-	Siloxane compound	-	3
-	N,N-Diethylformamide	-	10
-	Not identified	-	5
-	Aniline	-	4
-	Not identified	-	6
-	Benzothiazole	-	2

Total volatile organic compounds	Concentration (Test chamber air) [µg/m ³]	SER _a [µg/m ³ h]
TVOC_{2d}	32	25

Note: The test results exclusively refer to the submitted tested material. On changes of the composition or the production procedure of the material the report loses its validity. Publication of the test report requires permission in writing.



1.1.3 VVOC_{2d}

Test parameter:

Very volatile organic compounds (VVOC), test chamber, air sampling 2 days after test chamber loading

Test result:

No.	Substance	CAS No.	Concentration (Test chamber air) [µg/m ³]
VVOC_{2d}: Identified and calibrated substances in accordance with NIK list/AgBB, substance specific calculated (c_{id sub})			
10	Esters and Lactones		
10-2	Ethyl acetate	141-78-6	
VVOC_{2d}: Further identified and calibrated substances in accordance with NIK list/AgBB, substance specific calculated (c_{id sub})			
-	-	-	-
VVOC_{2d}: Not identified substances calculated as toluene equivalent (c_{ni tol})			
-	Diethylamin	-	45

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1.1.4 SVOC_{2d}

Test parameter:

Semi-volatile organic compounds (SVOC), test chamber, air sampling 2 days after test chamber loading

Test result:

No.	Substance	CAS No.	Concentration (Test chamber air) [µg/m ³]
SVOC_{2d}: Identified and calibrated substances in accordance with NIK list/AgBB, substance specific calculated (C_{id sub})			
-	-	-	-
SVOC_{2d}: Further identified and calibrated substances in accordance with NIK list/AgBB, substance specific calculated (C_{id sub})			
-	-	-	-
SVOC_{2d}: Not identified substances calculated as toluene equivalent (c_{ni tol})			
-	-	-	-

Total semi-volatile organic compounds	Concentration (Test chamber air) [µg/m ³]	SER _a [µg/m ³ h]
Σ SVOC _{2d}	-	-



Measurement time 7 days after test chamber loading

1.1.5 VOC_{7d} / TVOC_{7d}

Test parameter:

Volatile organic compounds (VOC), test chamber, air sampling 7 days after test chamber loading

Test result:

No.	Substance	CAS No.	Concentration (Test chamber air) [µg/m ³]
VOC_{7d}: Identified and calibrated substances in accordance with NIK list/AgBB, substance specific calculated (C_{id sub})			
-	-	-	-
VOC_{7d}: Further identified and calibrated substances in accordance with NIK list/AgBB, substance specific calculated (C_{id sub})			
-	-	-	-
VOC_{7d}: Not identified substances calculated as toluene equivalent (c_{ni tol})			
-	N,N-Diethylformamide	-	5
-	Not identified	-	4
-	Benzothiazole	-	2

Total volatile organic compounds	Concentration (Test chamber air) [µg/m ³]	SER _a [µg/m ³ h]
TVOC _{7d}	11	8



1.1.6 $VVOC_{7d}$

Test parameter:

Very volatile organic compounds ($VVOC$), test chamber, air sampling 7 days after test chamber loading

Test result:

No.	Substance	CAS No.	Concentration (Test chamber air) [$\mu\text{g}/\text{m}^3$]
$VVOC_{7d}$: Identified and calibrated substances in accordance with NIK list/AgBB, substance specific calculated ($c_{id\ sub}$)			
10	Esters and Lactones		
10-2	Ethyl acetate	141-78-6	3
$VVOC_{7d}$: Further identified and calibrated substances in accordance with NIK list/AgBB, substance specific calculated ($c_{id\ sub}$)			
-	-	-	-
V 02.X05	2-Methyl pentane	107-83-5	
$VVOC_{7d}$: Not identified substances calculated as toluene equivalent ($c_{ni\ tol}$)			
-	Diethylamin	-	12

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1.1.7 SVOC_{7d}

Test parameter:

Semi- volatile organic compounds (SVOC), test chamber, air sampling 7 days after test chamber loading

Test result:

No.	Substance	CAS No.	Concentration (Test chamber air) [µg/m ³]
SVOC_{7d}: Identified and calibrated substances in accordance with NIK list/AgBB, substance specific calculated (C_{id sub})			
-	-	-	-
SVOC_{7d}: Further identified and calibrated substances in accordance with NIK list/AgBB, substance specific calculated (C_{id sub})			
-	-	-	-
SVOC_{7d}: Not identified substances calculated as toluene equivalent (c_{ni tol})			
-	-	-	-

Total semi-volatile organic compounds	Concentration (Test chamber air) [µg/m ³]	SER _a [µg/m ³ h]
Σ SVOC _{7d}	-	-

Note: The test results exclusively refer to the submitted tested material. On changes of the composition or the production procedure of the material the report loses its validity. Publication of the test report requires permission in writing.



1.2 Carbon Disulfide CS₂

Test parameter:

Emissions of carbon disulfide CS₂ in the test chamber, air sampling 2 days after test chamber loading

Test method:

Preparation of test sample:	DIN EN ISO 16000-11 see No. 1.1 VOCs
Test chamber conditions:	DIN ISO 16000-9 and according to DIN V ENV 717-1 see No. 1.1 VOCs
Air sampling:	2 days after test chamber loading
Analytics:	DIN EN 16000-6
Detection limit:	1 µg/m ³

Test result:

Substance	Concentration (Test chamber air) [µg/m ³]
Carbon Disulfide CS ₂	21



1.3 Nitrosamines

Test parameter:

Emission of nitrosamines in the test chamber, air sampling 2 days after test chamber loading

Test method:

Preparation of test sample:	DIN EN ISO 16000-11 see No. 1.1 VOCs
Test chamber conditions:	DIN ISO 16000-9 and according to DIN V ENV 717-1 see No. 1.1 VOCs
Air sampling:	2 days after test chamber loading
Analytics:	BGI 505-23 determination of nitrosamines
Detection limit:	100 ng/m ³

Test result:

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

Note: The test results exclusively refer to the submitted tested material. On changes of the composition or the production procedure of the material the report loses its validity. Publication of the test report requires permission in writing.



1.4 Formaldehyde_{2d}

Test parameter:

Formaldehyde, test chamber, air sampling 2 days after test chamber loading

Test method:

Preparation of test sample:	according to DIN EN 717-1 see No. 1.1 VOCs
Test chamber conditions:	DIN EN 717-1 with the following deviations: <ul style="list-style-type: none"> – No determination of the equilibrium concentration; the formaldehyde emission is indicated at a measuring point as determined above. – For test chamber volume see No. 1.1 VOCs – Relative humidity: 50% Test chamber parameter: see No. 1.1 VOCs
Air sampling:	2 days after test chamber loading
Analytics:	DIN EN 16000-3
	Detection limit: 3 µg/m ³ ≈ 0,003 ppm

Test result:

Substance	Concentration (Test chamber air) [µg/m ³]	Concentration (Test chamber air) [ppm]
Formaldehyde	5	0,004



1.5 Odour testing

Test parameter:

Odour, test collective, odour test 24 hours after desiccator loading

Test method:

Analytics:

VDA recommendation 270 at 50 % humidity

Rating scale:

- | | |
|---|--|
| 1 | not perceivable |
| 2 | not disturbing |
| 3 | clearly discernable, not objectionable |
| 4 | objectionable |
| 5 | strongly discernable |
| 6 | intolerable |

Test result:

Temperature [°C]	Intensity [Note]	Odour characterisation
40	1 - 2	Product typical



Padding materials

Content analysis

2.1 Test parameter:

Polymers and filler percentage

Test method:

Analytically:	Ash/filler percentage: Thermogravimetry; Polymer percentage : IR/ATR
Benchmark:	Filler percentage: $\leq 5 \pm 1$ % Polymer percentage: NR ≥ 95 %

Test result:

Filler percentage	[weight/%]
Related to the total sample the polymer portion amounts to.	95
Related to the total sample the ash portion (including zinc oxide) amounts to.	5
Related to the total sample the filler portion amounts to ¹⁾	< 5
Polymer percentage	[weight/%]
Related to the polymer content the natural latex portion amounts to ²⁾	100
Related to the polymer content the synthetic latex portion amounts to ²⁾	0

¹⁾ The filler portion is calculated by the difference of ash portion and zinc oxide on the assumption that maximally 5% zinc oxide is contained related to the total weight of the expanded latex core.

²⁾ With findings < 5 % for natural latex the result is represented as 100 % synthetic latex. Usually no natural latex portion under 5 % is used.

Cologne, 8 October 2008

Dr. Hans-Ulrich Krieg
(Technical Manager)



Expert appraisal

The product 100 % Natural Latexfoam Mattress Block was submitted to laboratory tests on behalf of LATEX GREEN Company (PVT) Ltd. for an ecological product examination according to the eco-INSTITUT-Label test criteria Mattresses Status: June 2008. The results documented in the test report were evaluated as follows.

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Latex			
Test parameter	Concentration	Limit value	Within limits [yes/no]
Emission test			
TVOC (total volatile organic compounds) (2 days after test chamber loading)	32 µg/m ³	≤ 400 µg/m ³	yes
TVOC (total volatile organic compounds) (7 days after test chamber loading)	11 µg/m ³	≤ 200 µg/m ³	yes
VOC classified in: K1, K2; M1, M2; R1, R2 (as per TRGS 905, RL 67/548 EC); IARC group 1 & 2A; MAK III1, III2 (2 days after test chamber loading)	n.d.	≤ 2 µg/m ³	yes
VOC (sum) without LCI (7 days after test chamber loading)	11 µg/m ³	≤ 100 µg/m ³	yes
VOC (individual sums):			
Sum of sensitising materials with the following categorisations: DFG (MAK list): Category IV, German Federal Institute for Risk Assessment list: Cat A, TRGS 907 (7 days after test chamber loading)	n.d.	≤ 100 µg/m ³	yes
Sum of VOC with the following categorisations: Directive 67/548 EC: Carc. Cat. 3, Mut. Cat. 3, Repr. Cat. 3, TRGS 905: K3, M3, R3, IARC: Group 2B, DFG (MAK lists): Category III3 (7 days after test chamber loading)	n.d.	≤ 50 µg/m ³	yes
Disulfide	21 µg/m ³	≤ 50 µg/m ³ (2 days after test chamber loading)	yes
Nitrosamines	n.d.	≤ 0.3 µg/m ³ (2 days after test chamber loading)	yes
R value	< 1	≤ 1.0 (7 days after test chamber loading)	yes
Formaldehyde	0,004 ppm	≤ 0.02 ppm (2 days after test chamber loading)	yes
Odour	1 - 2	≤ Grade 3 (24 hours after loading of desiccator)	yes
Content analysis			
Polymer percentage	100 % NR	Declaration in %	---
Filler portion (ash content)	< 5	≤ 5%	yes

Note: The test results exclusively refer to the submitted tested material. On changes of the composition or the production procedure of the material the report loses its validity. Publication of the test report requires permission in writing.



Summary evaluation

The product 100 % Natural Latexfoam Mattress Block was submitted to an ecological product examination on behalf of LATEX GREEN Company (PVT) 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:
100 % Natural Latexfoam
For a period of two years.

Certification number	ID 1008 – 12244 – 001
Test report Number	19633
Validity	10/2010

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

Cologne, dated 8 October 2008

Aleksandra Vujovic
(Project Manager)



Appendix

Explanation of the Specific Emission Rate SER

Emission measurements are accomplished in test chambers under defined physical conditions (temperature, relative humidity, room loading, Air exchange 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)	refers the emission to the length
a = unit area (m ²)	refers the emission to the surface
v = unit volume (m ³)	refers the emission to the volume
u = piece unit (unit = piece)	refers the emission to the 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.

$$\boxed{\text{SER} = q \cdot C}$$

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

Mattress BlockMattress Block1 mg = 1000 µg.