



Produktprüfung
Zertifizierung
Qualitätssicherung

eco
INSTITUT



Natural Latex Foam Core

Haiku-Futon - Spain

Test Report No. 21810-1



ECO-INSTITUT GmbH
Sachsenring 69
50677 Köln

Fon +49-(0)221-931 245-0
Fax +49-(0)221-931 245-33

www.eco-institut.de
www.eco-info.de
info@eco-institut.de

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Test Report No. 21810-1

Client:	Haiku-Futon -Spain
Sample description by client:	Natural Latex Foam Core
Sample no.:	21810-1
Type of sample:	Natural latex foam
Sampled by:	Sri-Lanka
Date of sampling:	11th March 2010
Location of sampling:	Zone, Biyagama, Malwana, Sri Lanka
Date of production:	11th March 2010
Date of arrival of sample:	24th March 2010
Condition of sample:	without objection
Date of report:	30th April 2010
Number of pages of report:	22
Test parameter:	see table of contents
Testing laboratory:	eco-INSTITUT GmbH, Cologne * external laboratory

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Test report

Latex foam

1 Emission test

1.1 Volatile organic compounds (VOC)

Definition of terms:

VOC
 (volatile organic compounds)

All individual materials with a concentration $\geq 0,001 \text{ mg/m}^3$ in retention range C_6 (n-Hexane) to C_{16} (n-Hexadecane)
 Substances refer to LCI lists / AgBB (DIBt)
 Sum of all individual substances in retention range C_6 to C_{16} .

TVOC
 (Total volatile organic compounds)

CMR-VOC
 (carcinogenic, mutagenic, reproduction-toxic VOC)

All individual substances with the following categories:
 Regulation (EC) No. 1272/2008: Category Cat. 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
 All individual substances with concentration $\geq 0,001 \text{ mg/m}^3$ in retention range $< C_6$

VVOC
 (very volatile organic compounds)

SVOC
 (semi volatile organic compounds)

Total SVOC
 (Total semi volatile organic compounds)

All individual materials $\geq 0,001 \text{ mg/m}^3$ in retention range $> C_{16}$ (n-Hexadecane) to C_{22} (Docosane)
 Sum of all SVOC in retention range $> C_{16}$ to C_{22} .

Identified and calibrated substances ($C_{id \text{ sub}}$), substance specific calculated
 Not identified substances calculated as toluene equivalent ($C_{ni \text{ tol}}$)
 SER
 LCI value

Spectrum and retention time are concordant with the calibrated comparison substance
 Suggestion from the spectrum library with high probability and/or allocation to a group of substances

R value

Specific emission rate (see appendix)
 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)
 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.



Test method:

Preparation of test sample:

following 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:	
Dimensions:	related to the surface 16.7 cm x 16.7 cm x 16.0 cm

Test chamber conditions:

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:	0.5 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 (CMT VOC) and 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 CMT VOC_{2d}

Test parameter:

Carcinogenic, mutagenic and teratogenic volatile organic compounds (CMT VOC), test chamber, air sampling 2 days after test chamber loading

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Test result:

No.	Substance	CAS No.	Concentration (Test chamber air) [µg/m ³]	CMR classification*)
VOC _{3d} : Identified and calibrated substances in accordance with LCI list/AgBB, substance specific calculated (C _{id sub})				

VOC _{3d} : Further identified and calibrated substances in addition to LCI list/AgBB, substance specific calculated (C _{id sub})				

VOC _{3d} : Not identified substances calculated as toluene equivalent (c _{ni tol})				

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.



1.1.2 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. [$\mu\text{g}/\text{m}^3$]	Concentration (Test chamber air)
VOC _{2d} : Identified and calibrated substances in accordance with LCI list/AgBB, substance specific calculated (C _{id sub})			
7 Aldehydes			
7-3	Hexanal	66-25-1	2
9 Acids			
9-1	Acetic acid	64-19-7	6
12 Others			
12-4	Octamethylcyclotetrasiloxane	556-67-2	2
VOC _{2d} : Further identified and calibrated substances in addition to LCI list/AgBB, substance specific calculated (C _{id sub})			
-	Benzothiazole	-	4
VOC _{2d} : Not identified substances calculated as toluene equivalent (C _{ni tol})			
-	Siloxane compound	-	7
-	N,N-Diethylformamide	-	3
-	Isoalkan C10 – C11	-	9
-	Branched alken	-	2

Total volatile organic compounds	Concentration (Test chamber air) [$\mu\text{g}/\text{m}^3$]	SER _a [$\mu\text{g}/\text{m}^3\text{h}$]
TVOC _{2d}	35	27

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. [µg/m ³]	Concentration (Test chamber air)
VVOC _{2d} : Identified and calibrated substances in accordance with LCI list/AgBB, substance specific calculated (C _{id sub})			
-	-	-	-
VVOC _{2d} : Further identified and calibrated substances in addition to LCI list/AgBB, substance specific calculated (C _{id sub})			
-	-	-	-
VVOC _{2d} : Not identified substances calculated as toluene equivalent (C _{ni tol})			
-	Nitrogen compound	-	19



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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. [µg/m ³]	Concentration (Test chamber air)
SVOC _{2d} : Identified and calibrated substances in accordance with LCI list/AgBB, substance specific calculated (C _{id sub})			
-	-	-	-
SVOC _{2d} : Further identified and calibrated substances in addition to LCI 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. [µg/m³]	Concentration (Test chamber air)
VOC _{7d} : Identified and calibrated substances in accordance with LCI list/AgBB, substance specific calculated (C _{id sub})			
9Acids			
9-1	Acetic acid	64-19-7	6
12	Others		
12-4	Octamethylcyclotetrasiloxane	556-67-2	2
VOC _{7d} : Further identified and calibrated substances in addition to LCI list/AgBB, substance specific calculated (C _{id sub})			
-	Benzothiazole	-	4
VOC _{7d} : Not identified substances calculated as toluene equivalent (C _{ni tol})			
-	Siloxane compound	-	7
-	N,N-Diethylformamide	-	2
-	Isoalkan C10 – C11	-	3
-	Branched alken	-	2

Total volatile organic compounds	Concentration (Test chamber air) [µg/m³]	SER _a [µg/m³h]
TVOC _{7d}	24	18



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. [µg/m ³]	Concentration (Test chamber air)
VVOC _{7d} : Identified and calibrated substances in accordance with LCI list/AgBB, substance specific calculated (C _{id sub})			
-	-	-	-
VVOC _{7d} : Further identified and calibrated substances in addition to LCI list/AgBB, substance specific calculated (C _{id sub})			
-	-	-	-
VVOC _{7d} : Not identified substances calculated as toluene equivalent (C _{ni tol})			
-	Nitrogen compound	-	9



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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. [$\mu\text{g}/\text{m}^3$]	Concentration (Test chamber air)
SVOC _{7d} : Identified and calibrated substances in accordance with LCI list/AgBB, substance specific calculated (C _{id sub})			
-	-	-	-
SVOC _{7d} : Further identified and calibrated substances in addition to LCI 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) [$\mu\text{g}/\text{m}^3$]	SER _a [$\mu\text{g}/\text{m}^3\text{h}$]
Σ SVOC _{7d}	-	-



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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/m³

Test result:

Substance	Concentration (Test chamber air) [µg/m ³]
Carbon Disulfide CS ₂	10



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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)	310
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:
 - 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/m³ ≈ 0.003 ppm

Test result:

Substance	Concentration (Test chamber air) [µg/m ³]	Concentration (Test chamber air) [ppm]
Formaldehyde	<3	< 0.003



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	2	Product typical

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2 Content analysis

2.1 Polymers and filler percentage

Test parameter:
Polymers and filler percentage

Test method:

Analytics:

Ash/filler percentage: Thermogravimetry;
Polymer percentage: IR/ATR

Test result:

Filler percentage	[weight/%]
Related to the total sample the polymer portion amounts to.	94
Related to the total sample the ash portion (including zinc oxide) amounts to.	6
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, dated 30th April 2010

Dr. rer.-nat. Hans-Ulrich Krieg
(Technical Manager)



Appraisal

The product Natural Latex Foam Core was submitted to laboratory tests on behalf of Haiku-Futon, Spain for an ecological product examination according to the eco-INSTITUT-Label test criteria "Mattresses" (Status: February 2010).

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

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Latex foam			
Test parameter	Result / Emission	Limit value	Within limits [yes/no]
Emission test			
TVOC (total volatile organic compounds) (2 days after test chamber loading)	35 µg/m ³	≤ 400 µg/m ³	yes
TVOC (total volatile organic compounds) (7 days after test chamber loading)	18 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)	< 2 µg/m ³	≤ 2 µg/m ³	yes
VOC (sum) without LCI (7 days after test chamber loading)	16 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)	< 2 µg/m ³	≤ 100 µg/m ³	yes
Sum of VOC with the following categorisations: Regulation (EC) No. 1272/2008: Category Carc. 2, Muta. 2, Repr. 2, TRGS 905: K3, M3, R3, IARC: Group 2B, DFG (MAK list): Category III3 (7 days after test chamber loading)	2 µg/m ³	≤ 50 µg/m ³	yes
Sum C ₉ - C ₁₄ : Alkanes / Isoalkanes (7 days after test chamber loading)	8 µg/m ³	≤ 100 µg/m ³	yes
VOC (individual substances):			
Styrol (7 days after test chamber loading)	< 2 µg/m ³	≤ 10 µg/m ³	yes
Disulfide (2 days after test chamber loading)	10 µg/m ³	≤ 50 µg/m ³	yes
Nitrosamines (2 days after test chamber loading)	0.31 µg/m ³	≤ 0.3 µg/m ³	yes ¹
R value (7 days after test chamber loading)	< 1.0	≤ 1.0	yes
Formaldehyde (2 days after test chamber loading)	< 0.003	≤ 0.02 ppm	yes

¹ The measured value lies within range of measurement inaccuracy and is tolerabel.



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Latex foam			
Test parameter	Result / Emission	Limit value	Within limits [yes/no]
Emission test			
Odour (24 hours after loading of desiccator)	Grade 2	≤ Grade 3	yes

Bolster / wadding materials			
Test parameter	Content/ Result	Limit value	Threshold reached [yes/no]
Content analysis			
Polymer percentage	100 % NR	Declaration in %	---
Filler portion (ash content)	<5%	≤ 5%	yes



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Summary evaluation

The product Natural Latex Foam Core was submitted to an ecological product examination on behalf of Haiku-Futon, Spain 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:
Natural Latex Foam Core
for a period of two years.

Certification number	ID 0410 – 12826 – 001
Test report Number	21810-1
Validity	04 / 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 30th April 2010

Dr. rer.-nat. Frank Kuebart
(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 (m²) refers the emission to the surface

v = unit volume (m³) 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/m² h

volume-specific SER_v in µg/m³ 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.