ECO-UMWELTINSTITUT · Sachsenring 69 · D-50677 Köln

Nature Foams Int. (Pvt.) Ltd.
No. 02 Hunupitiya Cross Road

Colombo 02, Sri Lanka

TEST REPORT No. 12923

Description of sample:	**Natural latex core**
Kind of sample:	Latex
Client:	Copy of the original test report on behalf of Nature Foams Int. (Pvt.) Ltd., Colombo
Sampling by:	by client
Date of arrival of sample:	25.2.2005
Date:	11.4.2005
Number of pages:	10
Page:	1
Test parameter:	According to QUL e.V.: • Filler, polymer content *) • Nitrosamines (test chamber) **) • Pentachlorophenol (PCP), Tetrachlorophenol (TeCP) *) • VOC (Volatile organic compounds, test chamber) *) • Carbon disulfide (CS_2, test chamber) *)
Testing laboratories:	*) ECO-Umweltinstitut GmbH, Köln **) ISCONLAB Ges. für Umweltanalytik mbH, Heidelberg
Commercial use of this test report:	1 year [1]

[1] QUL = Qualitätsverband umweltverträgliche Latexmatratzen e.V.

Carbon disulfide (CS_2, test chamber)

Substance	*Concentration [µg/m³]*	*QUL-orientation value [µg/m³]*
Carbon disulfide CS_2	< 1	50

< = below detection limit

Detection limit: 1 µg/m³

Sample geometry: see VOC (Volatile organic compounds) test chamber

Chamber conditions: see VOC (Volatile organic compounds) test chamber

Test method: DIN ISO 16000-6

Cologne, 11.4.2005

Dr. H.-U. Krieg
(Laboratory Manager)

Assessment

The tested sample "natural latex core", manufactured by Nature Foams Int. (Pvt.) Ltd., fulfils the criteria of the "Qualitätsverband umweltverträgliche Latexmatratzen e.V." (QUL) to the above-mentioned range.

Cologne, 11.4.2005

Dr. Frank Kuebart
(Project Manager)

[1] For the interest of product safety we set a time limit of 1 year for commercial use of this report. Products with changing raw materials need a regular check for an effective quality control.

Filler, polymer content

Filler	*[weight/%]*
Polymer content, with reference to the sample	92,8
Ash content (incl. zinc oxide), with reference to the sample	7,2
Filler content, with reference to the sample [1)]	< 5
Polymer content	***[weight/%]***
NR, with reference to the polymer content [2)]	100
SBR, with reference to the polymer content	0

Remark:

[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.

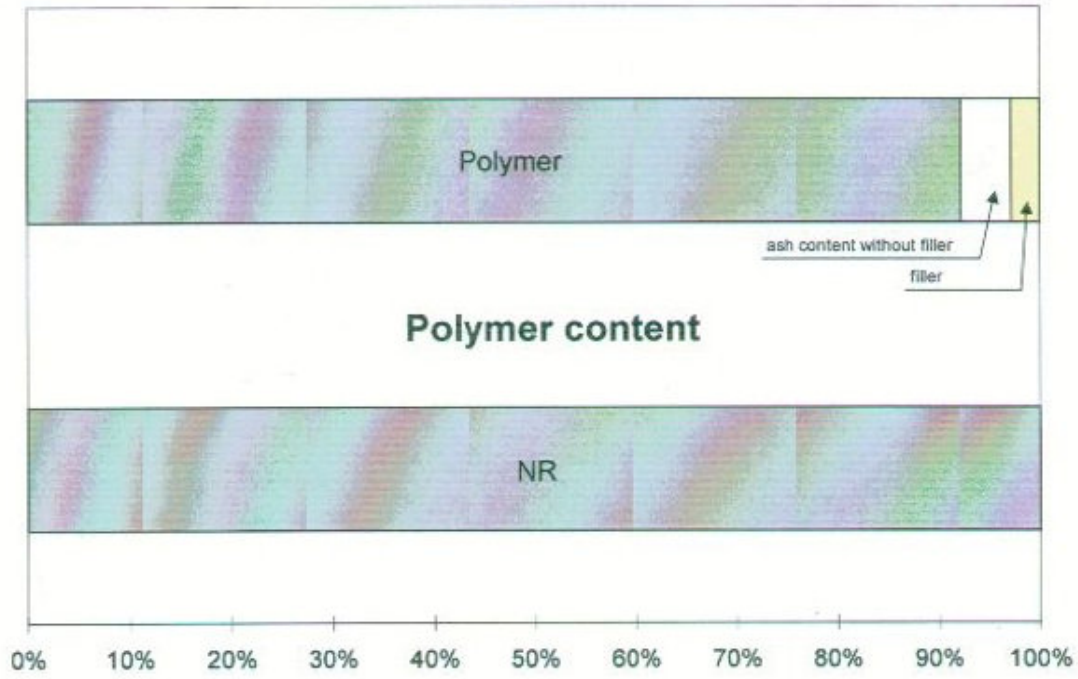
[2)] If NR-content is below 5 %, the result will be 100 % SBR. Usually there will be no use of NR below 5 % in a mixture of NR and SBR.

Demands by QUL e.V.:

Filler: ≤ 5 % ± 1 %

Polymer content: NR ≥ 95 %

Test methods: filler/ash: thermogravimetry; polymer content: IR/ATR.



Nitrosamines (test chamber)

Substance	*Concentration [ng/m³]*	*QUL-Orientation Value [ng/m³]*
N-Nitrosodimethylamine	< 100	---
N-Nitrosomethylethylamine	< 100	
N-Nitrosodiethylamine	< 100	---
N-Nitrosodiisopropylamine	< 100	---
N-Nitrosodipropylamine	< 100	---
N-Nitrosodibutylamine	< 100	---
N-Nitrosopiperidine	< 100	---
N-Nitrosopyrrolidine	< 100	---
N-Nitrosomorpholine	< 100	---
Total:	< 100	300

< = below detection limit

Detection limit: 100 ng/m³

Sample geometry and chamber conditions: see VOC (Volatile organic compounds) test chamber

Test method: according to „Hauptverband der gewerblichen Berufsgenossenschaften - ZH 1/120.23"

Pentachlorophenol (PCP), Tetrachlorophenol (TeCP)

Substance	*Content [mg/kg]*	*QUL-Orientation value [mg/kg]*
Pentachlorophenol (PCP)	0,03	0,1
Tetrachlorophenol (TeCP)	< 0,01	0,1

< = not detectable, below detection limit

Detection limit: 0,01 mg/kg

Test method: Extraction, esterification, clean up on silicagel in reference to DFG-method S19, analysis with GC/ECD.

VOC (Volatile organic compounds, test chamber)

Substance/-group Aromatic Hydrocarbons	Emission [mg/m³]	SER_a [µg/m²h]
Benzene	< 0,001	< 0,001
Toluene	< 0,001	< 0,001
Ethylbenzene	< 0,001	< 0,001
m/p-Xylene	< 0,001	< 0,001
o-Xylene	< 0,001	< 0,001
2-Ethyltoluene	< 0,001	< 0,001
3-Ethyltoluene	< 0,001	< 0,001
4-Ethyltoluene	< 0,001	< 0,001
n-Propylbenzene	< 0,001	< 0,001
Iso-Propylbenzene	< 0,001	< 0,001
1,2,4-Trimethylbenzene	< 0,001	< 0,001
1,3,5-Trimethylbenzene	< 0,001	< 0,001
1,2,3-Trimethylbenzene	< 0,001	< 0,001
Sum Diethylbenzene	< 0,001	< 0,001
1,2,4,5-Tetramethylbenzene	< 0,001	< 0,001
1,2,3,5-Tetramethylbenzene	< 0,001	< 0,001
1,2,3,4-Tetramethylbenzene	< 0,001	< 0,001
1,3-Diisopropylbenzene	< 0,001	< 0,001
1,4-Diisopropylbenzene	< 0,001	< 0,001
p-Cymene	< 0,001	< 0,001
Butylbenzene	< 0,001	< 0,001
Heptylbenzene	< 0,001	< 0,001
Octylbenzene	< 0,001	< 0,001
Nonylbenzene	< 0,001	< 0,001
Decylbenzene	< 0,001	< 0,001
Undecylbenzene	< 0,001	< 0,001
Naphthalene	< 0,001	< 0,001
1-Methylnaphthalene	< 0,001	< 0,001
2-Methylnaphthalene	< 0,001	< 0,001
Chlornaphthalene	< 0,001	< 0,001
Styrene	< 0,001	< 0,001
Alpha-Methylstyrene	< 0,001	< 0,001
∑ m,o,p-Methylstyrene	< 0,001	< 0,001
4-Phenyl-1-Cyclohexene	< 0,001	< 0,001
Phenylacetylen	< 0,001	< 0,001
Indene	< 0,001	< 0,001

Substance/-group	Emission [mg/m³]	SER_a [µg/m²h]
Aliphatic Hydrocarbons		
n-Hexane	< 0,001	< 0,001
n-Heptane	< 0,001	< 0,001
n-Octane	< 0,001	< 0,001
n-Nonane	< 0,001	< 0,001
n-Decane	0,003	0,002
n-Undecane	0,004	0,003
n-Dodecane	< 0,001	< 0,001
n-Tridecane	< 0,001	< 0,001
n-Tetradecane	< 0,001	< 0,001
n-Pentadecane	< 0,001	< 0,001
n-Hexadecane	< 0,001	< 0,001
Methylcyclopentane	< 0,001	< 0,001
Cyclohexane	< 0,001	< 0,001
Methylcyclohexane	< 0,001	< 0,001
1-Hexene	< 0,001	< 0,001
1-Octene	< 0,001	< 0,001
1-Decene	< 0,001	< 0,001
2,4,4-Trimethyl-1-pentene	< 0,001	< 0,001
4-Vinylcyclohexene	< 0,001	< 0,001
Dimethylcyclohexane	< 0,001	< 0,001
Tert.-Butylcyclohexane	< 0,001	< 0,001
Terpenes		
α-Pinene	< 0,001	< 0,001
β-Pinene	< 0,001	< 0,001
δ-3-Carene	< 0,001	< 0,001
Limonene	< 0,001	< 0,001
α-Terpinene	< 0,001	< 0,001
Borneol	< 0,001	< 0,001
Tr.-Caryophyllene	< 0,001	< 0,001
Terpineol	< 0,001	< 0,001
Alcohol's		
2-Propanol	< 0,001	< 0,001
1-Butanol	< 0,001	< 0,001
2-Ethyl-1-hexanol	< 0,001	< 0,001
Furfuryl alcohol	< 0,001	< 0,001

Substance/-group	Emission [mg/m³]	SER_a [µg/m²h]
Glycol's		
Ethylene glycol	< 0,001	< 0,001
Diethylene glycol	< 0,001	< 0,001
1,2-Propandiol	< 0,001	< 0,001
1,3-Propandiol	< 0,001	< 0,001
2-Methoxyethanol	< 0,001	< 0,001
2-Ethoxyethanol	< 0,001	< 0,001
2-Butoxyethanol	< 0,001	< 0,001
1-Methoxy-2-propanol	< 0,001	< 0,001
2-Butoxyethoxyethanol	< 0,001	< 0,001
2-Phenoxyethanol	< 0,001	< 0,001
1-Butoxy-2-propanol	< 0,001	< 0,001
2-Ethoxyethylacetate	< 0,001	< 0,001
2-Ethoxyethoxyethanol	< 0,001	< 0,001
2-Methyl-2,4-pentandiol	< 0,001	< 0,001
Isopropoxyethanol	< 0,001	< 0,001
2-Ethoxyethylether	< 0,001	< 0,001
2-(2-Methoxy-ethoxy)ethanol	< 0,001	< 0,001
3-Ethoxy-1-propanol	< 0,001	< 0,001
Diethylenglykolhexylether	< 0,001	< 0,001
Dipropylenglykolmethylether	< 0,001	< 0,001
2-Methoxyethylacetate	< 0,001	< 0,001
2-Ethoxyethylacetate	< 0,001	< 0,001
2-Butoxyethylacetate	< 0,001	< 0,001
1-Methoxy-2-propanolacetate	< 0,001	< 0,001
2-Butoxyethoxyethyl-acetate	< 0,001	< 0,001
Aldehydes		
n-Butanal	< 0,001	< 0,001
n-Pentanal	< 0,001	< 0,001
n-Hexanal	0,001	0,001
n-Heptanal	< 0,001	< 0,001
n-Oktanal	< 0,001	< 0,001
n-Nonanal	0,001	0,001
n-Dekanal	< 0,001	< 0,001
2-Butenal	< 0,001	< 0,001
2-Pentenal	< 0,001	< 0,001
2-Hexenal	< 0,001	< 0,001
2-Heptenal	< 0,001	< 0,001
2-Octenal	< 0,001	< 0,001
2-Nonenal	< 0,001	< 0,001
2-Decenal	< 0,001	< 0,001
2-Undecenal	< 0,001	< 0,001
Benzaldehyde	< 0,001	< 0,001
2,5-Dimethylbenzaldehyde	< 0,001	< 0,001
Glutardialdehyde	< 0,001	< 0,001
Furfurol	< 0,001	< 0,001
5-Methylfurfural	< 0,001	< 0,001

Substance/-group	Emission [mg/m³]	SER_a [µg/m²h]
Ketones		
Methylethylketone	< 0,001	< 0,001
Methylisobutylketone	< 0,001	< 0,001
2-Pentanone	< 0,001	< 0,001
Cyclohexanone	< 0,001	< 0,001
4-Methylcyclohexanone	< 0,001	< 0,001
Diisopropylketone	< 0,001	< 0,001
Acetophenone	0,001	0,001
Benzophenone	< 0,001	< 0,001
Acids		
Hexanoic acid	< 0,001	< 0,001
2-Ethylhexanoic acid	< 0,001	< 0,001
Esters		
Methylacetate	< 0,001	< 0,001
Ethylacetate	< 0,001	< 0,001
Butylacetate	< 0,001	< 0,001
Isobutylacetate	< 0,001	< 0,001
Isopropylacetate	< 0,001	< 0,001
3-Methylbutylacetate	< 0,001	< 0,001
Vinylacetate	< 0,001	< 0,001
Methyldecanoat	< 0,001	< 0,001
Succinicaciddimethylester	< 0,001	< 0,001
Glutaricaciddimethylester	< 0,001	< 0,001
Adipicaciddimethylester	< 0,001	< 0,001
Phenols		
Phenol	< 0,001	< 0,001
4-Chloro-3-methyl-phenol	< 0,001	< 0,001
o-Cresole	< 0,001	< 0,001
m,p-Cresole	< 0,001	< 0,001
Halocarbons		
cis-1,2-Dichlorethene	< 0,001	< 0,001
trans-1,2-Dichlorethene	< 0,001	< 0,001
Trichlorethene	< 0,001	< 0,001
Tetrachlorethene	< 0,001	< 0,001
1,1,1-Trichlorethane	< 0,001	< 0,001
1,4-Dichlorbenzene	< 0,001	< 0,001
Trichlormethane	< 0,001	< 0,001
Tetrachlormethane	< 0,001	< 0,001
1,2-Dichlorbenzene	< 0,001	< 0,001
1,3-Dichlorbenzene	< 0,001	< 0,001
1,2,3-Trichlorbenzene	< 0,001	< 0,001
1,2,4-Trichlorbenzene	< 0,001	< 0,001
1,3,5-Trichlorbenzene	< 0,001	< 0,001
1,2,3,5-Tetrachlorbenzene	< 0,001	< 0,001
1,2,4,5-Tetrachlorbenzene	< 0,001	< 0,001

Substance/-group	Emission [mg/m³]	SER_a [µg/m²h]
Phthalates		
DMP	< 0,001	< 0,001
DEP	< 0,001	< 0,001
DPP	< 0,001	< 0,001
DnBP	< 0,001	< 0,001
DiBP	< 0,001	< 0,001
Acrylates		
Ethylacrylate	< 0,001	< 0,001
Methylacrylate	< 0,001	< 0,001
n-Butylacrylate	0,004	0,003
Isobutyl-methacrylate	< 0,001	< 0,001
t-Butylacrylate	< 0,001	< 0,001
Methyl-methacrylate	< 0,001	< 0,001
Butyl-methacrylate	< 0,001	< 0,001
2-Ethylhexylacrylate	0,002	0,002
Glycid-methacrylate	< 0,001	< 0,001
1,6-Hexandioldiacrylate	< 0,001	< 0,001
Siloxane		
Hexamethylcyclotrisiloxane	< 0,001	< 0,001
Octamethylcyclotrisiloxane	< 0,001	< 0,001
Decamethylcyclotrisiloxane	< 0,001	< 0,001
Other calibrated VOC		
TXIB®[1]	< 0,001	< 0,001
Texanol®	< 0,001	< 0,001
2-Pentylfurane	< 0,001	< 0,001
THF	< 0,001	< 0,001
Aniline	0,007	0,005
DMF	< 0,001	< 0,001
1-Me-2-pyrrolidone	< 0,001	< 0,001
Benzothiazene	0,002	0,002
BHT	0,003	0,002
Total calibrated VOC:	0,028	0,022
Others non-calibrated VOC, quantified as toluene-equivalent		
Unsaturated alkene	0,002	0,002
Total non-calibrated VOC:	0,002	0,002
Total calibrated and non-calibrated VOC without isoaliphates:	**0,030**	**0,023**

QUL-orientation value without isoaliphates:	**0,5**	**0,39**

[1] TXIB® = 2,2,4-trimethyl-1,3-pentandiol diisobutyrat

< = below detection limit
Detection limit: 0,001 mg/m³
Orientation value for the single substance: 0,15 mg/m³

Substance/-group Isoaliphates	Emission [mg/m³]	SER_a [µg/m²h]
2-Methylpentane	< 0,001	< 0,001
3-Methylpentane	< 0,001	< 0,001
Iso-Octane	< 0,001	< 0,001
Total isoaliphate:	**< 0,001**	**< 0,001**

QUL-orientation value isoaliphate:	**0,5**	**0,39**

< = below detection limit
Detection limit: 0,001 mg/m³
Orientation value for the single substance: 0,15 mg/m³

Sample geometry:
- sealed edges: No
- Loading related to: area
- Sample volume: 28 x 28 x 15 cm

Chamber conditions: according to the standards DIN EN 13419 and DIN V ENV 717-1 i. A.
- Volume: 0,25 m³
- Temperature: 23°C
- Rel. Humidity: 45 %
- Pressure: Normal
- Air: Clean
- Air change rate: 1,0 h^{-1}
- Air velocity: 0,3 m/s
- Loading: 1,3 m²/m³
- Specific air flow rate: 0,77 m³/m²*h
- Sampling after: 48 h after loading of test chamber

Test method: DIN ISO 16000-6