

Latexco NV
Sint Amandstraat 8b
8700 Tielt, Belgium

Test Report No. 51673-001

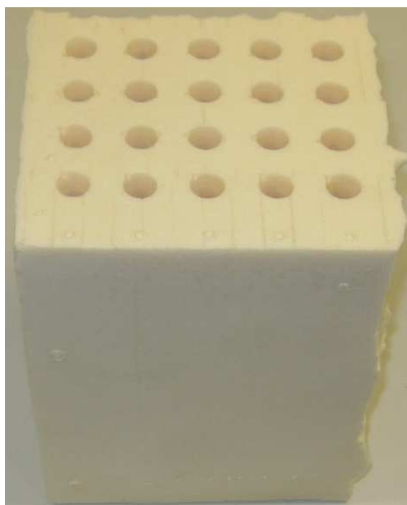
Test objective:	Evaluation according to eco-INSTITUT-Label-criteria
Sample description by client:	Natural Foam Core
Sampled by:	CVBA Van Ryckeghem
Date of sampling:	31.10.2016
Location of sampling:	at the client
Date of production:	26.10.2016
Date of arrival of sample:	08.11.2016
Test period:	08.11.2016 - 05.12.2016
Date of report:	05.12.2016
Number of pages of report:	24
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	100% Natural Latex Core	without objection	Latex foam



A001: 100% Natural Latex Core

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 **Natural Foam Core** was submitted to laboratory tests on behalf of **Latexco NV** 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.

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)	30 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	6 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)	6 µg/m ³	≤ 50 µg/m ³	yes
TVOC (total volatile organic compounds including SVOC with LCI)	9 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	4 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)	4 µg/m ³	≤ 100 µg/m ³	yes
Bicyclic terpenes (Sum)	< 1 µg/m ³	≤ 200 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]
C9 – C14 Alkanes / Isoalkanes (Sum)	5 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	0.04	≤ 1	yes
Nitrosamines (only latex products)	n.d.	≤ 300 ng/m ³	yes
Disulphide (only latex products)	34 µg/m ³	≤ 50 µg/m ³	yes
Odour	2.5	≤ Grade 3 (24 hours after loading of desiccator)	yes

P31 Upholstery / padding materials: Latex			
Test parameter	Result / Emission	Limit value	Within limits [yes/no]
Content analysis			
Polymer content (NR: natural rubber)	A001 100 % NR	not applicable	not applicable
Filler content	A001 0.0 %	≤ 5 %	yes

n.d.: not determinable

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Summary evaluation

The product **Natural Foam Core** was submitted to an ecological product examination on behalf of **Latexco NV** 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:
Natural Foam Core*

*This certification is valid only for the foam. Any other materials that might be used in combination with the foam (e.g. adhesives or cover materials) are excluded from the certification.

for a period of two years.

Certification number	ID 1114 – 33337 – 001
Test report Number	51673-001
Validity	11/2018

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, 27.12.2016



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
------------	-----------------------------------------------------------------------------------------------------------

A001: Preparation of test sample

Date:	15.11.2016
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:	14.8 cm x 14.8 cm x 20 cm

A001: Test chamber conditions according to DIN ISO 16000-9

Chamber volume:	0.125 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 days after test chamber loading 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: 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: 100% Natural Latex Core

No.	Substance	CAS No.	RT [min]	Concentration+ (test chamber air) Substances ≥ 1 µg/m³ 2 days [µg/m³]	Toluene- equivalent Substances ≥ 5 µg/m³ 2 days [µg/m³]	CMR Classifi- cation++	LCI AgBB 2015 [µg/m³]	R- value
1	Aromatic hydrocarbons							
1-4	p-Xylene (including m-Xylol)	106-42-3	10.35	3			500	0,01
1-6	o-Xylene	95-47-6	10.92	1			500	0,00
2	Aliphatic hydrocarbons (n-, iso- and cyclo-)							
2-10.2	n-Decane	124-18-5	13.02	1			6000	0,00
2-10.3	n-Undecane	1120-21-4	15.17	4			6000	0,00
2-10.4	n-Dodecane	112-40-3	17.22	4			6000	0,00
2-10.5	n-Tridecane	629-50-5	19.57	2			6000	0,00
3	Terpenes							
3-1	3-Carene	498-15-7	13.58	2			1500	0,00
3-2	α-Pinene	80-56-8	11.91	2			2500	0,00
3-4	Limonene	138-86-3	13.99	3			5000	0,00
7	Aldehyde							
7-20	Acetaldehyde	75-07-0		2		Carc. 2	1200	0,00
7-22	Formaldehyde	50-00-0		6		Carc. 1B Muta. 2	100	0,06
8	Ketones							
8-10	Acetone	67-64-1		2			1200	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)	Toluene- equivalent	CMR	LCI	R- value
				Substances ≥ 1 µg/m ³ 2 days [µg/m ³]	Substances ≥ 5 µg/m ³ 2 days [µg/m ³]	Classifi- cation++	AgBB 2015 [µg/m ³]	
13	Other identified substances in addition to LCI list							
	Benzothiazole	95-16-9	18.69	4				
	diethylamine*		4.63	67				
	diethylformamide*		11.59	2				
	not identified*		12.13	4				
	not identified*		13.11	2				

+ 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	< 5	< 3.85
Sum of VOC according to AgBB 2015 / DIBt	< 5	< 3.85
Sum of VOC according to eco-INSTITUT-Label	30	23
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	73	56
Sum of VVOC according to eco-INSTITUT-Label	77	59

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)	8	6.2
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)	8	6.2
Sensitising compounds with the following categorisations: DFG (MAK list): Category IV, German Federal Institute for Risk Assessment lists: Cat A, TRGS 907 (Sum)	13	10
Bicyclic Terpenes	4	3.1
C9 - C14: Alkanes / Isoalkanes as dekane-equivalent (Sum)	11	8.5
C4 - C11 Aldehydes, acyclic, aliphatic (Sum)	< 2	< 1.54
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	0.08
R-value according to AgBB 2015 / DIBt	0.06
R-value according to Belgian regulation	0.00
R-value according to AFSSET	0.60

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.

1.2 Sample A001: 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: 100% Natural Latex Core

No.	Substance	CAS No.	RT [min]	Concentration+ (test chamber air)	Toluene- equivalent	CMR Classifi- cation++	LCI AgBB 2015 [µg/m³]	R- value
				Substances ≥ 1 µg/m³ after 7 days [µg/m³]	Substances ≥ 5 µg/m³ after 7 days [µg/m³]			
2	Aliphatic hydrocarbons (n-, iso- and cyclo-)							
2-10.3	n-Undecane	1120-21-4	15.14	2			6000	0,00
2-10.4	n-Dodecane	112-40-3	17.19	2			6000	0,00
2-10.5	n-Tridecane	629-50-5	19.53	1			6000	0,00
7	Aldehyde							
7-20	Acetaldehyde	75-07-0		2		Carc. 2	1200	0,00
7-22	Formaldehyde	50-00-0		4		Carc. 1B Muta. 2	100	0,04
8	Ketones							
8-10	Acetone	67-64-1		2			1200	0,00
13	Other identified substances in addition to LCI list							
	Benzothiazole	95-16-9	18.66	3				
	diethylamine*		4.63	25				
	diethylformamide*		11.59	1				
	not identified*		12.13	5	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: 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	< 5	< 3,85
Sum of VOC according to AgBB 2015 / DIBt	< 5	< 3,85
Sum of VOC according to eco-INSTITUT-Label	9	6,9
Sum of VOC according to ISO 16000-6	30	23

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	25	19
Sum of VVOC according to eco-INSTITUT-Label	33	25

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)	4	3.1
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)	6	4.6
Sensitising compounds with the following categorisations: DFG (MAK list): Category IV, German Federal Institute for Risk Assessment lists: Cat A, TRGS 907 (Sum)	4	3.1
Bicyclic Terpenes	< 1	< 0.77
C9 - C14: Alkanes / Isoalkanes as dekane-equivalent (Sum)	5	3.9
C4 - C11 Aldehydes, acyclic, aliphatic (Sum)	< 2	< 1.54
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	0.00
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: | A001: 100% Natural Latex Core

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	31.5
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

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: 100% Natural Latex Core	Carbon disulfide CS ₂	2	34

2 Odour test following VDA recommendation 270

Test parameter:

Odour

Test method:

Analytics:	Following VDA recommendation 270												
Conditions of dessicator:													
Temperature:	40 °C												
Relative humidity:	50 %												
Sampling time:	24 hours after loading of dessicator												
Grading scale:	<table><tr><td>1</td><td>not perceptible</td></tr><tr><td>2</td><td>perceptible, not bothering</td></tr><tr><td>3</td><td>clearly perceptible, not bothering</td></tr><tr><td>4</td><td>bothering</td></tr><tr><td>5</td><td>strongly bothering</td></tr><tr><td>6</td><td>unbearable</td></tr></table>	1	not perceptible	2	perceptible, not bothering	3	clearly perceptible, not bothering	4	bothering	5	strongly bothering	6	unbearable
1	not perceptible												
2	perceptible, not bothering												
3	clearly perceptible, not bothering												
4	bothering												
5	strongly bothering												
6	unbearable												

Test result:

Sample: A001: 100% Natural Latex Core

Intensity of odour [Grade]
2.5

3 Polymer content[#]

Test parameter:

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

Test method:

Analytics: | IR/ATR

Test result:

Sample: | A001: 100% Natural Latex Core

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.

4 Ash content#

Test parameter:

Ash content, filler content

Test method:

Analytics: | Thermogravimetry

Test result:

Sample	Parameter	[weight/%]
A001: 100% Natural Latex Core	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, 05.12.2016



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

Appendix

I Sampling Sheet

eco-INSTITUT-Label Sampling Sheet*



LATEXCO NV
 Sint-Amandstraat 8
 8790 Tielit

Test laboratory	eco-INSTITUT GmbH Sachsenring 69, D-50677 Cologne Germany Tel. +49 (0)221 - 931245-0 Fax +49 (0)221 - 931245-33	Sampler (Name, Company, Phone)	CVBA Van Ryckeghem & Co Keizerstraat 18 8790 Waregem BELGIUM
Name of the producer / distributor at the place of sampling (Address / Stamp)	LATEXCO NV Sint amandstr 8 8790 Tielit	Producer (if different from the company name at the place of sampling)	

Product name	100% natural core 20cm	Product type (e.g. parquet, floor covering)	100% Natural.
Modell / Program / Series	BPA315 / *20	Batch	L5 W43
Article number		Production date of the batch	26/10/2016

Samples are taken ...	<input checked="" type="checkbox"/> from current production <input type="checkbox"/> storage	Sampling date	31/10/2016
Storage location before sampling	<input checked="" type="checkbox"/> Production <input type="checkbox"/> Storage <input type="checkbox"/> Others	Storage conditions before sampling	<input checked="" type="checkbox"/> open <input type="checkbox"/> packaged
Storage location:	Latexco production	Packaging material:	PE bag

Special features (possible negative effects through emissions at the place of sampling (e.g. benzine, exhaust fumes), unclarities, questions etc.)

Validation
 Hereby the signer affirms the accuracy of the above-mentioned statements. The sample was chosen, sampled and packaged according to the guide for taking samples.

Date: 02/11/2016
 Signature: *[Signature]*
 (Stamp)

B.V. VAN RYCKEGHEM & CO
 BEDRIJFSREVISOREN / REVISEURS D'ENTREPRISES
 Keizerstraat 18
 B - 8790 WAREGEM

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

[Signature]
 Certified Public Accountant



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GENERAL MANAGING DIRECTORS: DR. HANS-ULRICH KRIEG / DR. FRANK KUEBART
 SAJEEV JESUDAS / MICHAEL SALTZMANN / GITTE SCHJØTZ
 REGIONAL COURT OF COLOGNE/ HRB 25664 / USTLD DE 811775799
 RAIFFEISENBANK FRECHEN-HUERTH
 BIC: GENODE33HAN // IBAN/SWIFT: DE02370623651703060010

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)

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)
Ethylene glycol (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)
Ethyl diglycol
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
Ethanedial (Glyoxal)
Glutaraldehyde
Benzaldehyde
Acetaldehyde^{1,3}
Formaldehyde^{1,3}
Propanal^{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 glycol diacrylate

Chlorinated hydrocarbons

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

Others

1,4-Dioxane
Caprolactam
N-Methyl-2-pyrrolidone
Octamethylcyclotrisiloxane
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.