eurofins | Product Testing

ilac-MRA DANAK TEST Reg.nr. 522

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Polyflor Limited
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UNITED KINGDOM

VOC TEST REPORT
AgBB

12 October 2015

1 Sample Information

Sample identification	392-2015-00260201
Sample name	OHMega EC
Batch no.	0504521
Production date	Aug 2015
Product type	Flooring
Sample reception	28/08/2015

2 Brief Evaluation of the Results

Regulation or protocol	Conclusion	Version of regulation or protocol
AgBB	Pass	AgBB of June 2012. DIBt of October 2010

Full details based on the testing and direct comparison with limit values is available in the following pages

Lise L. Clement
Chemist

Janne R. Norup
Chemist

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3 Applied Test Methods

3.1 General Test References

Regulation, protocol or standard	Version	Reporting limit VOC [µg/m³]	Calculation of TVOC	Combined uncertainty¤ [RSD(%)]
CEN/TS 16516	October 2013	5	Toluene equivalents	22.5%
ISO 16000 -3 -6 -9 -11	2006-2011 depending on part	2	Toluene equivalents	22.5%
AgBB/DIBt	June 2012/October 2010	5	Compound Specific	22.5%

3.2 Specific Laboratory Sampling and Analyses

Parameter	External Method	Internal S.O.P.	Quantification limit	Analytical principle	Uncertainty¤ [RSD(%)]
Sample preparation	ISO 16000-11:2006, EN16402:2013, CDPH, AgBB/DIBt, EMICODE	71M549810	-	-	5%
VOC emission chamber testing	ISO 16000-9:2006, CEN/TS 16516:2013	71M549811	-	Chamber and air control	5%
Sampling of VOC	ISO 16000-6:2011, CEN/TS 16516:2013	71M549812	5 L	Tenax TA	5%
Analysis of VOC	ISO 16000-6:2011, CEN/TS 16516:2013	71M542808B	1 µg/m³	ATD-GC/MS	10%
Sampling of aldehydes	ISO 16000-3:2011, CEN/TS 16516:2013	71M549812	35 L	DNPH	5%
Analysis of aldehydes	ISO 16000-3:2011, EN 717-1, CEN/TS 16516:2013	71M548400	3-6 µg/m³	HPLC-UV	10%

4 Test Parameters, Sample Preparation and Deviations

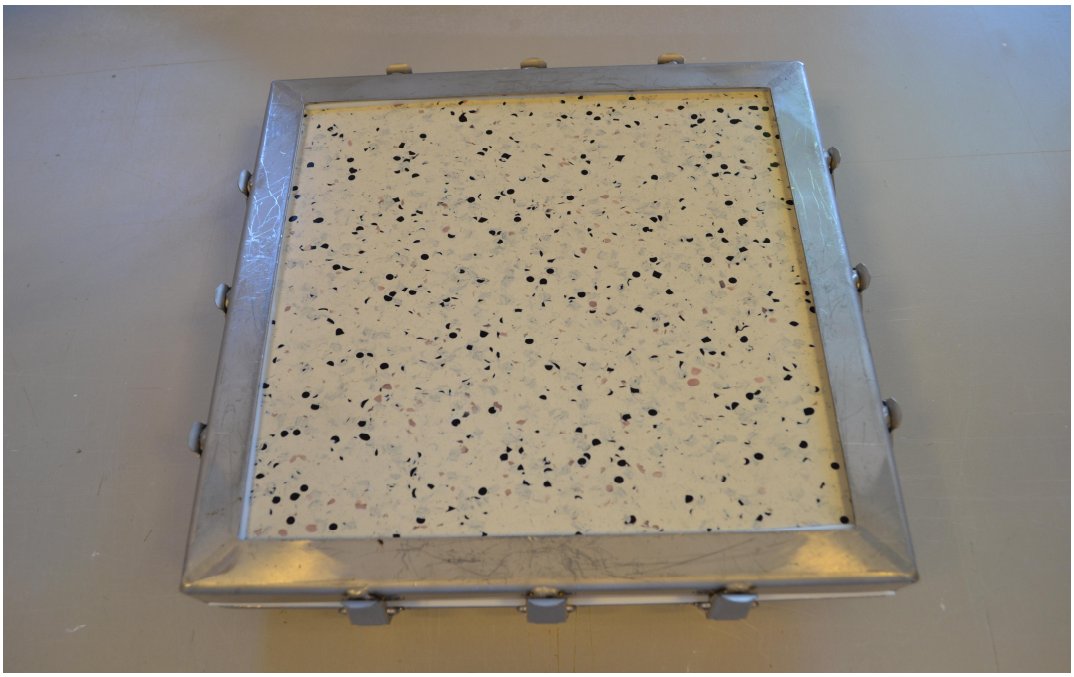
4.1 VOC Emission Chamber Test Parameters

Parameter	Value	Parameter	Value
Chamber volume, V[L]	119	Preconditioning period	-
Air Change rate, n[h^{-1}]	0.5	Test period	02/09/2015 - 30/09/2015
Relative humidity of supply air, RH [%]	50 ± 3	Area specific ventilation rate, q [m/h or $m^3/m^2/h$]	1.25
Temperature, T [°C]	23 ± 1	Loading factor [m^2/m^3]	0.4

4.2 Preparation of the Test Specimen

Edges and back were covered with aluminium foil and the sample was mounted into a frame in accordance with JIS A 1901.

4.3 Picture of Sample



4.4 Deviations from Referenced Protocols and Regulations

No deviations from the referenced test methods were observed.

5 Results

5.1 VOC Emission Test Results after 3 Days

	CAS No.	Retention time [min]	ID-Cat	Specific Conc. [µg/m³]	Toluene eq. [µg/m³]	Specific SER [µg/(m²*h)]	R_D
VOC with NIK							
1-Butanol	71-36-3	2.54	1	3.7	1.1	4.6	-
1,2-Propandiol (Propylene glycol)	57-55-6	3.48	1	7.1	1.6	8.9	0.0028
2,2,4,6,6-Pentamethylheptane	13475-82-6	8.36	1	81	93	100	0.014
2-Ethyl-1-hexanol	104-76-7	8.92	1	35	25	44	0.065
Sum of VOC with NIK				120	120	150	
VOC without NIK							
Not identified *	-	9.05	4	5.7	5.7	7.2	-
Not identified *	-	9.24	4	3.0	3.0	3.8	-
Not identified *	-	9.29	4	1.3	1.3	1.6	-
Not identified *	-	9.35	4	1.0	1.0	1.3	-
Not identified *	-	10.29	4	1.2	1.2	1.5	-
Sum of VOC without NIK				5.7	5.7	7.2	
TVOC				130	120	160	
VVOC compounds							
None determined							
TVVOC				< 5	< 5	< 7	
SVOC compounds							
None determined							
TSVOC				< 5	< 5	< 7	
Carcinogens							
Total carcinogens				< 1	< 1	< 2	
R-values							0.081

5.2 VOC Emission Test Results after 28 Days

	CAS No.	Retention time [min]	ID-Cat	Specific Conc. [µg/m³]	Toluene eq. [µg/m³]	Specific SER [µg/(m²*h)]	R_D
VOC with NIK							
1,2-Propandiol (Propylene glycol)	57-55-6	3.46	1	6.2	1.1	7.7	0.0025
2,2,4,6,6-Pentamethylheptane	13475-82-6	8.34	1	49	56	61	0.0081
Butylhydroxytoluene BHT *	128-37-0	14.28	1	1.5	2.0	1.9	-
Sum of VOC with NIK				55	56	69	
VOC without NIK							
Not identified *	-	8.90	4	14	14	18	-
Not identified *	-	9.03	4	3.4	3.4	4.3	-
Not identified *	-	9.22	4	1.8	1.8	2.3	-
Sum of VOC without NIK				14	14	18	
TVOC				69	70	87	
VVOC compounds							
None determined							
TVVOC				< 5	< 5	< 7	
SVOC compounds							
None determined							
TSVOC				< 5	< 5	< 7	
Carcinogens							
Total carcinogens				< 1	< 1	< 2	
Aldehydes							
Formaldehyde	50-00-0		1	< 3	-	< 4	
Acetaldehyde	75-07-0		1	< 3	-	< 4	
Propionaldehyde	123-38-6		1	< 3	-	< 4	
Butyraldehyde	123-72-8		1	< 3	-	< 4	
R-values							0.011

6 Summary and Evaluation of the Results

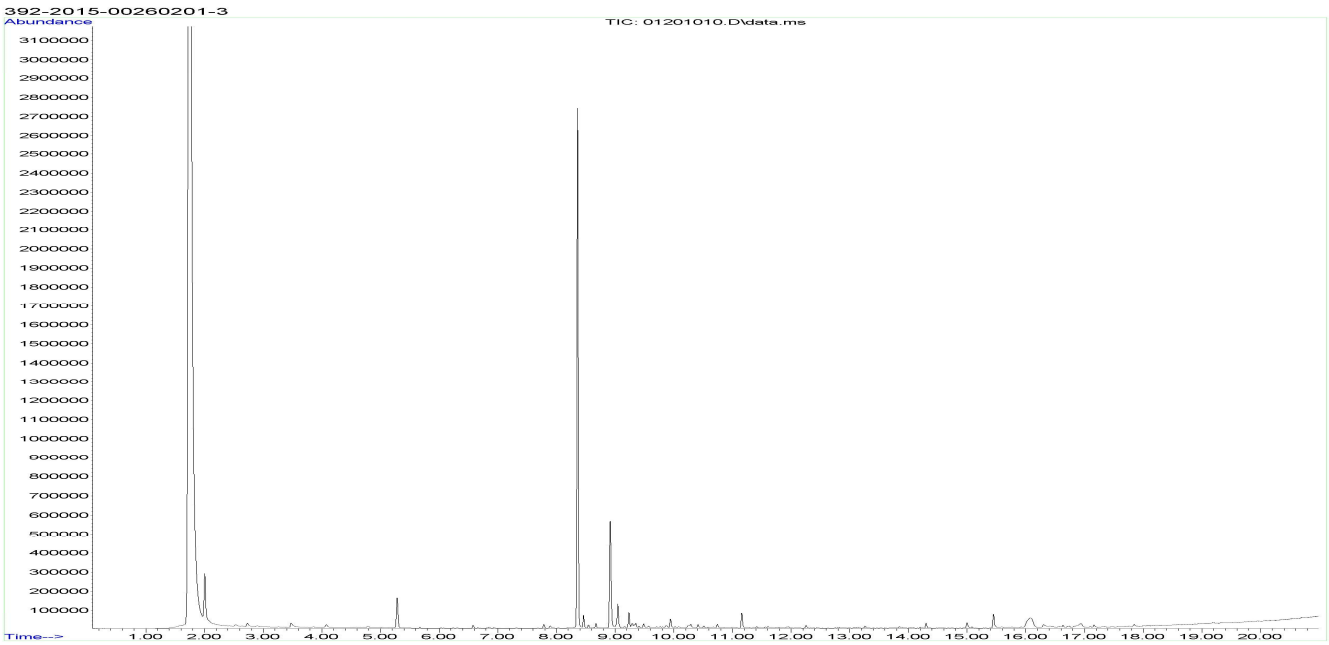
6.1 Comparison with Limit Values of AgBB

Parameter	Test after 3 days		Test after 28 days	
	Concentration mg/m³	Limit Value mg/m³	Concentration mg/m³	Limit Value mg/m³
TVOC	0.13	≤ 10	0.069	≤ 1.0
TSVOC	< 0.005	-	< 0.005	≤ 0.1
R-value (dimensionless)	0.081	-	0.011	≤ 1
Sum without NIK	0.0057	-	0.014	≤ 0.1
Formaldehyde	-	-	< 0.003	≤ 0.1
Total carcinogens	< 0.001	≤ 0.01	< 0.001	≤ 0.001

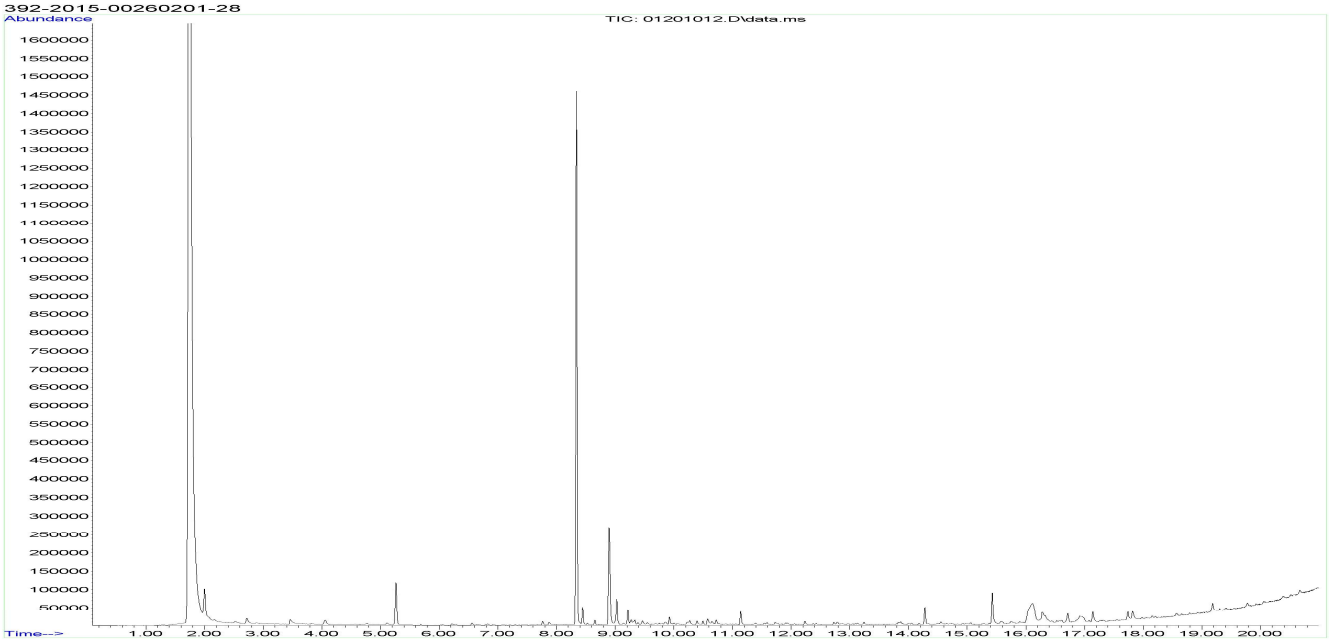
Compliance with the limits alone does not entitle to use the AgBB requirements in conjunction with approval by DIBt. This requires an application, site inspection, and approval. See www.eurofins.com/dibt-procedures.

7 Appendices

7.1 Chromatogram of VOC Emissions after 3 Days



7.2 Chromatogram of VOC Emissions after 28 Days



Please consider the different scales.

7.3 ADAM

1. Allgemeine Angaben - General information

Prüfstelle Testing laboratory	**Eurofins Product Testing A/S**
Verantwortlicher Prüfer Responsible laboratory staff	**Lise Clement**
Prüfberichtsnr. Number of the test report	**392-2015-00260201_D**
Kunde/Antragsteller Client/Applicant	**Polyflor Limited**
Produktname und Artikelnr. Name of the product and material number	**OHMega EC**
Aktenzeichen beim DIBt File number at DIBt	Stellen-zeichen: -1. / SVA-Nr. / Sachgebiet / lfd. Nr. / Jahr (2 Ziffern) / Unter-sachgebiet
Art der Prüfung Type of testing	A: 28 / S_Q / S_C / S_{CL}
Probenbezeichnung Name of the sample	**OHMega EC**
Datum des Probeneingangs bei der Prüfstelle Date of receipt of the sample	**DATE28/08/2015**
Lagerung der Probe bis zur Prüfung Storage of the sample until testing	**unopened at room temperature**

2. Beschreibung des Bauprodukts - Description of the construction product

Bitte auswählen! Choose, please!

- ○ Textile Bodenbeläge - Textile floor coverings
- ○ Laminate und Paneele - Laminates and panels
- ○ Parkette und Holzfußböden - Parquet and wood floorings
- ◉ Elastische Bodenbeläge - Resilient floor coverings
- ○ Beschichtungen - Coatings
- ○ Korkbodenbeläge - Cork floor coverings
- ○ Sportbodenbeläge - Surfaces for sport areas
- ○ Oberflächenbeschichtungen - Surface coatings
- ○ Bodenbelagskleber - Adhesives for floor coverings
- ○ Verlegeunterlagen - Underlayers
- ○ Sonstige Produkte - Other products

Elastische Bodenbeläge - Resilient floor coverings		***Herstellerangaben Manufacturer's data***	***Prüfstellenangaben Testing laboratory's data***
Allgemeine Produktbeschreibung (z.B. PVC, Kautschuk, PUR, Polyolefin, Linoleum) General description of the product (e.g. PVC, rubber, polyurethane, polyolefin, linoleum)		**PVC**	**PVC**
Abmessung der gelieferten Probe [mm x mm] Dimensions of the delivered sample [mm x mm]			
Bei PVC-Belägen bitte angeben, ob heterogen oder homogen Please specify für PVC floor coverings, if it's heterogeneous or homogeneous			
Herstellungsart Manufacturing method			
Oberseitengestaltung Surface design			
Farbgestaltung/Musterung Colour design/patterning		60003 Warm Haze	Multicoloured
Trittschalldämmung (falls vorhanden) Impact sound insulation (if relevant)	Produktbeschreibung Product description		
	Dicke [mm] Thickness [mm]		
Kleber für Trittschalldämmung Adhesive used for impact sound insulation	Bezeichnung Product name		
	Auftragsmenge [g/m²] Coating quantity [g/m²]		
Gesamtdicke [mm] Total thickness [mm]		2.0	2.0
Flächengewicht [g/m²] Area weight [g/m²]		3060	2900
Oberflächenbeschichtung (falls vorhanden) Surface coating (if relevant)	Chemische Basis Chemical basis		
	Auftragsmenge [g/m²] Applied quantity [g/m²]		
Kantenabdeckung? Verhältnis der offenen zu den abgedeckten Kanten? Covering of the edges? Ratio of covered edges to uncovered edges?			All edges covered
weitere Angaben Additional information			

3. Bemerkungen (z.B. Produktbesonderheiten, Abweichungen von "Grundsätzen zur gesundheitlichen Bewertung von Bauprodukten in Innenräumen" etc.) (neue Zeile mit [ALT] + [RETURN])
Comments (e.g. particularities on the product, variation of the "Principles for health assessment of construction products used in interiors" etc.) (new line with [ALT] + [RETURN])

DIBt file number was not delivered by manufacturer and have to be inserted into the ADAM report by Eurofins Product Testing A/S before sending the report to DIBt.

ADAM_2012_08_3

Produktname - Name of the product	OHMega EC
Datum der Prüfkörperherstellung Date of the manufacture of the test specimen	02/09/2015
Herstellung des Prüfkörpers durch Preparation of the test specimen by	HBA
verwendete Hilfsmaterialien used auxiliary materials	Frame JIS A 1901

Prüfung - Testing		Datum date	Uhrzeit time
Beginn der Vorkonditionierung Start of preconditioning	t_{0-x}		
Einbringen der Probe in die Prüfkammer und Beginn der Prüfung Placing of the test specimen into the test chamber and start of testing	t_0	02/09/2015	09:00
erste Probenahme first sampling	t_{3d}	05/09/2015	08:34
zweite Probenahme second sampling	t_{7d}		
dritte Probenahme third sampling	t_{28d}	30/09/2015	09:53
Prüfkörperanordnung in der Prüfkammer Arrangement of the test specimen in the test chamber		mittig / in the middle	
Anwendung der Abbruchkriterien Use of the break-off criteria	3d/7d		

Prüfkammer - Test chamber		
Hersteller/Typ der Prüfkammer Manufacturer/type of the test chamber		Eurofins
Material der Prüfkammer Material of the test chamber		Edelstahl / Stainless steel
Volumen der Prüfkammer Volume of the test chamber	[m³]	0,12
Fläche der Probe Area of the test specimen	[m²]	0,05
Luftwechselrate Air exchange rate	[h^{-1}]	0,50
flächenspezifische Luftdurchflussrate q Area specific air flow rate	[mh^{-1}]	1,25
Temperatur Temperature	[°C]	50 ± 3
relative Luftfeuchte relative humidity	[%]	23 ± 1

Berücksichtigungsgrenzen - Limits of consideration	C_i [µg/m³]
Substanzen mit NIK-Wert Substances with LCI value	5
alle anderen Substanzen*) all other substances	5
LCI list 2012	
AgBB scheme 2012	

Auswahl NIK-Liste/AgBB-Schema
(choice of LCI list/AgBB scheme)

***) mit Ausnahme aller cancerogenen Substanzen, hier gilt Nachweisgrenze**
with exception of all carcinogenic substances, detection limit applies here

Anmerkungen zur Prüfung (neue Zeile mit [ALT] + [RETURN])
Comments on testing (new line with [ALT] + [RETURN])

ADAM_2012_08_3

Emissionen nach 3 Tagen Emission after 3 days														legend
OHMega EC	Kommentar Comment	CAS-No.	RT [min]	Retentionsbereich Retention range	Quantifizierung Quantification	Identifikation Identification	C_i [µg/m³]	SER_i [µg/m²h]	Zuordnung Classification [canc./NIK/o.NIK] [carc./LCI/no LCI]	R_i	lfd. Nr Serial number	ADAM_2012_08_3		VVOC = < C6 VOC = C6 - C16 SVOC = C16 - C22 a = substanzspezifisch substance-specific b = substanzähnlich substance-like c = Toluoläquivalent toluene equivalent d = DNPH 1 = Klasse 1 class 1 2 = Klasse 2 class 2 3 = Klasse 3 class 3
gefundene Substanzen Detected substances	Daten nur über den Button "Messergebnisse eingeben/löschen" in diese Tabelle eintragen Data to be entered only via the button "enter/delete results"													
1-Butanol		71-36-3	2,54	VOC	a	1	4	4,63	3100	0,001	4-6	1		
Propylene glycol		57-55-6	3,48	VOC	a	1	7	8,88	2500	0,003	6-1	1		
2,2,4,6,6-Pentamethylheptane		13475-82-6	8,36	VOC	a	1	81	101,25	6000	0,014	2-10	1		
2-Ethyl-1-hexanol		104-76-7	8,92	VOC	a	1	35	43,75	540	0,065	4-10	1		
Not identified		-	9,05	VOC	c	3	6	7,13	ohne NIK			0		
Not identified		-	9,24	VOC	c	3	3	3,75	ohne NIK			0		
Not identified		-	9,29	VOC	c	3	1	1,63	ohne NIK			0		
Not identified		-	9,35	VOC	c	3	1	1,25	ohne NIK			0		
Not identified		-	10,29	VOC	c	3	1	1,50	ohne NIK			0		

Emissionen nach 28 Tagen Emission after 28 days														legend
OHMega EC	Kommentar Comment	CAS-No.	RT [min]	Retentionsbereich Retention range	Quantifizierung Quantification	Identifikation Identification	C_i [µg/m³]	SER_i [µg/m²h]	Zuordnung Classification [canc./NIK/o.NIK] [carc./LCI/no LCI]	R_i	lfd. Nr Serial number	ADAM_2012_08_3		VVOC = < C6 VOC = C6 - C16 SVOC = C16 - C22 a = substanzspezifisch substance-specific b = substanzähnlich substance-like c = Toluoläquivalent toluene equivalent d = DNPH 1 = Klasse 1 class 1 2 = Klasse 2 class 2 3 = Klasse 3 class 3
gefundene Substanzen Detected substances	Daten nur über den Button "Messergebnisse eingeben/löschen" in diese Tabelle eintragen Data to be entered only via the button "enter/delete results"													
Propylene glycol		57-55-6	3,46	VOC	a	1	6	7,75	2500	0,002	6-1	1		
2,2,4,6,6-Pentamethylheptane		13475-82-6	8,34	VOC	a	1	49	61,25	6000	0,008	2-10	1		
Not identified		-	8,90	VOC	c	3	14	17,50	ohne NIK			0		
Not identified		-	9,03	VOC	c	3	3	4,25	ohne NIK			0		
Not identified		-	9,22	VOC	c	3	2	2,25	ohne NIK			0		
BHT		128-37-0	14,28	VOC	a	1	2	1,88	100	0,015	5-2	1		
Formaldehyd		50-00-0	0,00	VVOC	d	1	0	0,00			7-22	1		

Probenbezeichnung Name of the sample	**OHMega EC**
Aktenzeichen beim DIBt File number of DIBt	
Prüfinstitut Testing laboratory	**Eurofins Product Testing A/S**

Wichtige Informationen (important information)

Tabellenblätter schützen protect worksheets

Blattschutz aufheben unprotect worksheets

Ergebnisüberblick **General view of the results** ADAM_2012_08_3		**3 Tage (days)**			**7 Tage (days)** Keine Daten vorhanden - No data available			**28 Tage (days)**		
		Ergebnisse results	AgBB Anforderungen requirements	Abbruchkriterien break-off criteria	Ergebnisse results	Abbruchkriterien break-off criteria		Ergebnisse results	AgBB Anforderungen requirements	
		µg/m³	mg/m³	mg/m³	µg/m³	mg/m³		µg/m³	mg/m³	
[A]	**TVOC (C_6 - C_{16})**	128,8	0 ≤ 10 mg/m³	0,1 ≤ 0,3 mg/m³	0	0,0 ≤ 0,5 mg/m³		69,2	0,1 ≤ 1,0 mg/m³	
[B]	**Σ SVOC (C_{16} - C_{22})**	0	keine none	0,00 ≤ 0,03 mg/m³	0	0,00 ≤ 0,05 mg/m³		0	0,0 ≤ 0,1 mg/m³	
[C]	**R** (dimensionslos/dimensionless)	0,081	keine none	0,1 ≤ 0,5	0,000	0,0 ≤ 0,5		0,011	0 ≤ 1	
[D]	**Σ VOC o. NIK** **without LCI**	5,7	keine none	0,01 ≤ 0,05 mg/m³	0	0,00 ≤ 0,05 mg/m³		14	0,0 ≤ 0,1 mg/m³	
[E]	**Σ Cancerogene**	0	0,00 ≤ 0,01 mg/m³	0,000 ≤ 0,001 mg/m³	0	0,000 ≤ 0,001 mg/m³		0	0,000 ≤ 0,001 mg/m³	
Dieser Block liefert zusätzliche Information This part gives some additional information										
[F]	VVOC (< C_6)	0			0			0		
[G]	VOC (C_6 - C_{16}) als Toluoläquivalent as toluene equivalent	120	← Wert manuell eingeben! Enter value manually!			← Wert manuell eingeben! Enter value manually!		70	← Wert manuell eingeben! Enter value manually!	
[H]	**Formaldehyd** Formaldehyde	n.n.	keine none	≤ 0,060 mg/m³	n.n.	≤ 0,060 mg/m³		0	0,000 ≤ 0,120 mg/m³	

The results are only valid for the tested sample(s).

7.4 Sampling Report

Testing laboratory/ Inspection body: **Name of the manufacturer at the place of sampling** (address / stamp):	**Eurofins Danmark A/S** Product Emissions Testing Lab, Smedeskovvej 38, DK-8464 Galten, Denmark **Polyflor Limited** PO Box 3, Radcliffe New Road, Whitefield, Manchester M45 7NR, England	**Sampler** (Name, company, telephone): **Manufacturer** (if deviating from company's name at the place of sampling):	**Anthony Kendrick** Polyflor Limited +44 161 767 1111

Name of the product: **Model / Program / Series:** Article N°.: Misc.	**OHMega EC**	**Type of product** * (e.g. laminate, textile flooring, PVC-flooring): **Batch N°.:** **Date of batch production:**	**PVC Flooring** **0504521** **August 2015**

Sample is taken from **Where had the product been stored prior to sampling?**	Place of storage : **Wrapped up straight from production**	**Date of sampling:** **Time:** **How had the product been stored prior to sampling?**	**14 August 2015** → **wrapped up** Packing material : **Polythene film with antistatic additive**

Specifics (possible negative influences by emission at the place of taking the sample, petrol emissions, solvent emissions from production, uncertainties, questions, etc).	

Confirmation
The signer herewith confirms the correctness of the data given above. The sample was selected, drawn and packed personally in accordance with the instructions for the taking of samples.

Date: 17th July 2015	Signature: (Stamp) POLYFLOR LTD. P.O. BOX 3 RADCLIFFE NEW ROAD WHITEFIELD MANCHESTER M45 7NR

- You are requested to fill out one sampling report per sample! The instructions for sampling have to be followed without fail.

7.5 How to Understand the Results

7.5.1 Acronyms Used in the Report

< Means less than

> Means bigger than (Tube/GC-MS overload)

* Not a part of our accreditation

¤ Um(%) is given as 2x RSD%. Please see section regarding Uncertainty in the Appendices.

§ Deviation from method. Please see deviation section

a The method is not optimal for very volatile compounds. For these substances smaller results and a higher measurement uncertainty cannot be ruled out.

b The component originates from the wooden panels and is thus removed.

c The results have been corrected by the emission from wooden panels.

d Very polar organic compounds are not suitable for reliable quantification using tenax TA adsorbent and HP-5 GC column. A high degree of uncertainty must be expected.

SER Specific emission rate.

7.5.2 Explanation of ID Category

Categories of Identity:

1: Identified and specifically calibrated

2: Identified by comparison with a mass spectrum obtained from library and supported by other information. Calibrated as toluene equivalent.

3: Identified by comparison with a mass spectrum obtained from a library. Calibrated as toluene equivalent.

4: Not identified, calibrated as toluene equivalent.

7.6 Applied LCI and NIK Values

7.6.1 LCI/NIK Values for Compounds found after 3 Day Measurements

Compound	CAS No.	AgBB 2012 NIK [µg/m³]
1-Butanol	71-36-3	3100
1,2-Propandiol (Propylene glycol)	57-55-6	2500
2,2,4,6,6-Pentamethylheptane	13475-82-6	6000
2-Ethyl-1-hexanol	104-76-7	540

7.6.2 LCI/NIK Values for Compounds found after 28 Day Measurements

Compound	CAS No.	AgBB 2012 NIK [µg/m³]
1,2-Propandiol (Propylene glycol)	57-55-6	2500
2,2,4,6,6-Pentamethylheptane	13475-82-6	6000
Butylhydroxytoluene BHT *	128-37-0	100

7.7 Qualitative Description of VOC Emission Test

7.7.1 Test Chamber

The test chamber is made of stainless steel. A multi-step air clean-up is performed before loading the chamber, and a blank check of the empty chamber is performed.
The chamber operation parameters are as described in the test method section. (CEN/TS 16516, ISO 16000-9, internal method no.: 71M549811).

7.7.2 Expression of the Test Results

All test results are calculated as specific emissions rate, and as extrapolated air concentration in the European Reference Room (CEN/TS 16516, AgBB, EMICODE, M1 and Indoor Air Comfort).

7.7.3 Testing of Carcinogenic VOCs

The emission of carcinogens (EU Categories C1A and C1B, as per European law) is tested by drawing sample air from the test chamber outlet through Tenax TA tubes after the specified duration of storage in the ventilated test chamber. Analysis is performed by ATD-GC/MS (automated thermal desorption coupled with gas chromatography and mass spectroscopy using 30 m HP-5 (slightly polar) column with 0.25 mm ID and 0.25 µm film, Agilent) (CEN/TS 16516, ISO 16000-6, internal methods no.: 71M549812 / 71M542808B).

All identified carcinogenic VOCs are listed; if a carcinogenic VOC is not listed then it has not been detected. Quantification is performed using the TIC signal and authentic response factors, or the relative response factors relative to toluene for the individual compounds.

This test only covers substances that can be adsorbed on Tenax TA and can be thermally desorbed. If other emissions occur, then these substances cannot be detected (or with limited reliability only).

7.7.4 Testing of VOC, SVOC and VVOC

The emissions of volatile organic compounds are tested by drawing sample air from the test chamber outlet through Tenax TA tubes after the specified duration of storage in the ventilated test chamber. Analysis is performed by ATD-GC/MS using HP-5 column (30 m, 0.25mm ID, 0.25µm film) (CEN/TS 16516, ISO 16000-6, internal methods no.: 71M549812 / 712808B).

All single substances that are listed with a LCI/NIK value in the latest publications (hereafter referred to as target compounds) are identified if present. All other appearing VOCs are identified as far as possible. Quantification of target compounds is done using the TIC signal and authentic response factors, or the relative response factors relative to toluene. For certain compound groups, which differ significantly in chemistry from toluene, quantification is performed relative to a representative member of the group for more accurate and precise results. This can include quantification of for example glycols and acids. In addition to that, all results are also expressed in toluene equivalents. All non-target compounds, as well as all non-identified substances, are quantified in toluene equivalents.

The results of the individual substances are calculated in three groups depending on their retention time when analyzing using a non-polar column (HP-1):

- Volatile Organic Compounds (VOC) are defined as: All substances eluting between and including n-hexane (n-C6) and n-hexadecane (n-C16)
- Semi-Volatile Organic Compounds (SVOC) are defined as: All substances eluting after n-hexadecane (n-C16) and before and including n-docosane (n-C22)
- Very Volatile Organic Compounds (VVOC) are defined as: All substances eluting before n-hexane (n-C6).

Total Volatile Organic Compounds (TVOC) is calculated by summation of all individual VOCs with a concentration ≥ 5 µg/m³. The TVOC can be expressed either in toluene equivalents as defined in CEN/TS 16516 and similar to ISO 16000-6, or as the sum of concentrations using specific or relative response factors. In the case of summation of concentrations using authentic or relative response factors, the toluene equivalent is applied to all non-target and non-identified VOCs before summing up. Compounds regarded as VOC in line with the above definition but elute before n-C6 or after n-C16 on the HP-5 column are treated as VOC, and are thus added to the TVOC.

Total Semi-Volatile Organic Compounds (TSVOC) is calculated by the summation of all individual SVOCs expressed in toluene equivalents with a concentration ≥ 5 µg/m³, as defined in CEN/TS 16516. VOCs that are regarded as VOC in line with the above definition, but elute after n-C16 in this test, are not added to the TSVOC.

Total Very Volatile Organic Compounds (TVVOC) is calculated by the summation of all individual VVOCs with a concentration ≥ 5 µg/m³ and expressed in toluene equivalents. VOCs that are regarded as VOC in line with the above definition, but elute before n-C6 in this test, are not added to the TVVOC.

This test only covers substances which can be adsorbed on Tenax TA and can be thermally desorbed. If emissions of substances outside these specifications occur then these substances cannot be detected (or with limited reliability only).

7.7.5 Calculation of R Values with LCI Lists

The concentrations of detected compounds ≥ 5 µg/m³ are divided by their respective LCI/NIK value (if defined in the given publication). The sum of the quotients gives the R value, which can be mathematically expressed:

$$R = \sum_{i}^{n} \left({}^{c_i}/_{NIK_i} + \ldots + {}^{c_n}/_{NIK_n} \right)$$

This R value is calculated, depending on the purpose of this test, for the European LCI list, for the German LCI/NIK list (R_D), and/or for the Belgian LCI list (R_B).

All VOCs without published LCI/NIK value and concentration ≥ 5 µg/m³ are summed up as sum of VOCs without LCI/NIK if required by the standard or protocol.

7.7.6 Testing of Aldehydes

The presence of aldehydes after the specified duration of storage in the ventilated test chamber is tested by drawing air samples from the test chamber outlet through DNPH-coated silicagel tubes after the specified duration of storage in the ventilated test chamber. Analysis is performed by solvent desorption and subsequently by HPLC and UV-/diode array detection (CEN/TS 16516, ISO 16000-3, VDI 3862 Blatt 3, internal methods no.: 71M549812 / 71M548400).

The absence of formaldehyde and other aldehydes is stated if UV detector response at the specific wavelength is lacking at the specific retention time in the chromatogram. Otherwise it is checked whether the reporting limit is exceeded. In this case the identity is finally checked by comparing full scan sample UV spectra with full scan standard UV spectra.

7.8 Quality Assurance

Before loading the test chamber, a blank check of the empty chamber is performed and compliance with background concentrations in accordance with CEN/TS 16516 / ISO 16000-9 is determined.

Air sampling at the chamber outlet and subsequent analysis is performed in duplicate. Relative humidity,

temperature and air change rate in the chambers is logged every 5 minutes and checked daily. A double determination is performed on random samples at a regular interval and results are registered in a control chart to ensure the uncertainty and reproducibility of the method.

The stability of the analytical system is checked by a general function test of device and column, and by use of control charts for monitoring the response of individual substances prior to each analytical sequence.

7.9 Accreditation

The testing methods described above are accredited on line with EN ISO/IEC 17025 by DANAK (no. 522). This accreditation is valid worldwide due to mutual approvals of the national accreditation bodies (ILAC/IAF, see also www.eurofins.com/galten.aspx#accreditation.

Not all parameters are covered by this accreditation. The accreditation does not cover parameters marked with an asterisk (*), however analysis of these parameters is conducted at the same level of quality as for the accredited parameters.

7.10 Uncertainty of the Test Method

The relative standard deviation of the overall analysis is 22.5%. The expanded uncertainty Um equals 2 x RSD. For further information please visit www.eurofins.dk/uncertainty.