

INFORME No.: 077528-3

CLIENTE	INDUSTRIAS JUNO, S.A.
PERSONA DE CONTACTO	Luis Gil
DIRECCIÓN	B.º Saconi, 10 48950 ERANDIO (Bizkaia)
OBJETO	Emisión de VOCs y clasificación según el esquema AgBB 2018
MUESTRA ENSAYADA	«AQUALAC BRILLANTE»
FECHA DE RECEPCIÓN	05.11.2018
FECHAS DE ENSAYO	15.11.2018 / 27.12.2018
FECHA DE EMISIÓN	25.01.2019



Blanca Ruiz de Gauna
Jefe Laboratorio de Caracterización de
Materiales de Construcción
División Lab_services

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CARACTERISTICAS DE LAS MUESTRAS

Con fecha 05.11.2018 se recibió en Fundación TecNALIA R&I por parte de la empresa **“INDUSTRIAS JUNO, S.A.”** una muestra de pintura referenciada como:

- «AQUALAC BRILLANTE» que representa al grupo de pinturas «AQUALAC BRILLANTE», «AQUALAC SATINADO» y «AQUALAC MATE»

ENSAYOS SOLICITADOS

Los ensayos solicitados son los siguientes:

- ♦ Ensayo de emisión de VOC's (Compuestos orgánicos volátiles) según la norma ISO 16000-6:2006 para establecer una clasificación según los criterios establecidos en el esquema AgBB 2018. Los ensayos se han realizado en el laboratorio acreditado “eco-INSTITUT” cuyo informe original se adjunta como Anexo I.

ENSAYOS REALIZADOS

Preparación de la muestra de ensayo:

- Aplicación sobre vidrio
- Modo de aplicación: Aplicación mediante brocha hasta obtener un rendimiento de 130g/m².
- Secado/pre-acondicionado: 72 horas fuera de la cámara de ensayo.
- Acondicionamiento previo: 3 días.

El ensayo se ha realizado en una cámara con las siguientes condiciones:

- Condiciones de la cámara de ensayo
 - Volumen: 0,125m³
 - Temperatura y humedad relativa: 23°C al 50% HR.
 - Presión: atmosférica
 - Renovación del aire: 0,5 h⁻¹
 - Velocidad del aire: 0,3 m/s

La determinación de las emisiones de VOC's para establecer una clasificación según los criterios establecidos se ha desarrollado según indica la norma ISO 16000-6:2006 para VOC's (El límite de detección de las técnicas empleadas es de 1 µg/m³) y según la norma ISO 16000-3 para aldehídos y cetonas (siendo el límite de detección para aldehídos y cetonas de 2 µg/m³).

RESULTADOS

Los resultados de Compuestos orgánicos volátiles (VOCs) obtenidos tras 3 días se resumen en las siguientes tablas:

Tabla I

No.	Substancia	Nº CAS.	RT [min] Tiempo de retención	Concentración + (aire cámara ensayo) Substancias ≥ 1 $\mu\text{g}/\text{m}^3$ 3 días [$\mu\text{g}/\text{m}^3$]	Equivalente tolueno Substancias $\geq 5 \mu\text{g}/\text{m}^3$ 3 días [$\mu\text{g}/\text{m}^3$]	Clasificación CMR	LCI AgBB 2018 [$\mu\text{g}/\text{m}^3$]	Valor R
6	Glicoles, éteres de glycol y ésters de glicol							
6-1	Propylene glycol (1,2-Dihydroxypropane)	57-55-6	6.94	150	49		2100	0.07
6-5	Diethylene glycol- monobutylether	112-34-5	16.78	49	35		670	0.07
6-12	Dipropylene glycol monomethyl ether	34590-94-8	12.64+12.71	24	21		3100	0.01
6-42	3-Methoxy-1-butanol	2517-43-3	8.96	56	37		500	0.11
7	Aldehído							
7-8	Decanal	112-31-2	7.15	2			900	0.00
9	Ácidos							
9-1	Ácido acético	64-19-7	4.48	8			1200	0.01
10	Esteres							
10-12	2-Ethylhexyl acetate	103-09-3	15.80	1			350	0.00
13	Otras sustancias identificadas además de las de la lista LCI							
	Hexamethylcyclotrisiloxane (D3)	541-05-9	8.35	2				
	m/z 69 55 83*		23-24	7	7			

+ Sustancias identificadas y calibradas, sustancias calculadas específicamente.

++ Clasificación según el reglamento (EC) N° 1272/2008: Categorías Carc. 1A y 1B, Muta. 1A y 1B, Repr. 1A y 1B, TRGS 905: K1 y K2, M1 y M2, R1 y R2, IARC: Grupo 1 y 2A, DFG (Lista MAK): Categoría III1 y III2

* Sustancias no identificadas, calculadas como equivalente de tolueno referenciadas como los fragmentos másicos representativos expresados como relación masa/carga (m/z)

Tabla II

Componentes carcinógenos, mutagénicos y tóxicos para la reproducción*	Concentración tras 3 días [µg/m³]	SER_a [µg/m²h]
CMR 1: VOC (incl. VVOC y SVOC) clasificados como: - Reglamento (EC) No. 1272/2008 en las siguientes categorías: Carc. 1A y 1B, Muta. 1A y 1B, Repr. 1A y 1B; - TRGS 905: K1, K2, M1, M2, R1, R2; - IARC: Grupo 1 y 2A; - DFG (lista MAK): Categorías III1, III2 (Suma)	< 1	< 10
C 1: VOC (incl. VVOC y SVOC) clasificados como: - Reglamento (EC) No. 1272/2008 en las siguientes categorías: Carc. 1A u. 1B, (Suma)	< 1	< 10

Tabla III

TVOC, Compuestos Orgánicos Volátiles Totales	Concentración tras 3 días [µg/m³]	SER_a [µg/m²h]
Suma de VOC según DIN EN 16516	150	1500
Suma de VOC según AgBB 2018 / DIBt	290	2900
Suma de VOC según eco-INSTITUT-Label	300	3000
Suma de VOC según ISO 16000-6	200	2000

Tabla IV

TSVOC, Compuestos Orgánicos Semivolátiles Totales	Concentración tras 3 días [µg/m³]	SER_a [µg/m²h]
Suma de SVOC según DIN EN 16516	< 5	< 50
Suma de SVOC sin LCI según AgBB 2018 / DIBt	< 5	< 50
Suma de SVOC sin LCI según eco-INSTITUT-Label	< 1	< 10
Suma de SVOC con LCI según AgBB 2018 / DIBt	< 5	< 50

* Excluyendo el formaldehído (Carc. 1B) debido a que se asume un "valor límite práctico" por el que no se prevé un riesgo carcinogénico significativo (ver Federal Institute for Risk Assessment (2006): Toxicological evaluation of formaldehyde and Federal Environment Agency (2016): Reference value for formaldehyde in indoor air). En el caso de una evaluación de emisión toxicológica se necesita un análisis individual de la concentración de formaldehído. En opinión del comité para los valores guía de aire interior (Ausschuss für Innenraumrichtwerte) de la Agencia Federal de Medioambiente, no debería excederse, tampoco para un periodo corto de tiempo, la concentración de 0.1 mg formaldehído/m³ de aire interior, basada en la medida durante media hora (Bundesgesundheitsblatt 2016 · 59: 1040-1044 DOI 10.1007 / s00103 -016-2389-5 © Springer-Verlag Berlin Heidelberg 2016).

Tabla V

TVVOC Compuestos Orgánicos Muy Volátiles Totales	Concentración tras 3 días [µg/m³]	SER_a [µg/m²h]
Suma de VVOC según AgBB 2018 / DIBt y regulación belga	< 5	< 50
Suma de VVOC según eco-INSTITUT-Label	< 1	< 10

Tabla VI

Suma de otros Compuestos Orgánicos Volátiles (VOC)	Concentración tras 3 días [µg/m³]	SER_a [µg/m²h]
Suma de otros VOC sin LCI según AgBB/DIBt y reglamento belga	7	70
Suma de otros VOC sin LCI según eco-INSTITUT-Label	9	90
CMR 2: VOC (incl. VVOC y SVOC) correspondientes a las categorías: - Reglamento (EC) No. 1272/2008: Categoría Carc. 2, Muta. 2, Repr. 2; - TRGS 905: K3; - IARC: Grupo 2B; - DFG (lista MAK): Categorías III3 (Suma)	< 1	< 10
Compuestos sensibilizantes categorizados como: DFG (lista MAK): Categoría IV, Lista German Federal Institute for Risk Assessment lists: Cat A, TRGS 907 (Suma)	< 1	< 10
Terpenos bicíclicos	< 1	< 10
C9 - C14: Alcanos / Isoalcanos expresado como equivalentes de decano (Suma)	< 1	< 10
C4-C11 aldehidos, acíclicos, alifáticos (Suma)	2	20
C9-C15 Bencenos alquilados (Suma)	< 1	< 10
Cresoles (Suma)	< 1	< 10

Tabla VII

Valor de riesgo para evaluación de LCI	Valor R
Valor R según eco-INSTITUT-Label	0.28
Valor R según AgBB 2018 / DIBt	0.27
Valor R según regulación belga	0.27
Valor R según AFSSET	1.62

Nota:

Los valores de R pueden variar debido a los distintos requisitos de las distintas guías. Para los compuestos carbonilos de cadena corta (C₁-C₅), que se cuantifican por HPLC según la norma DIN ISO 16000-3, no se especifica indicación del equivalente en tolueno. Por lo tanto estas sustancias se consideran con su cuantificación de sustancia-específica en el TVVOC según DIN EN 16516.

Los resultados de Compuestos orgánicos volátiles (VOCs) obtenidos tras 28 días se resumen en las siguientes tablas:

Tabla VIII

No.	Substancia	N° CAS.	RT [min] Tiempo de retención	Concentración + (aire cámara ensayo) Substancias ≥ 1 $\mu\text{g}/\text{m}^3$ 28 días [$\mu\text{g}/\text{m}^3$]	Equivalente tolueno Substancias ≥ 5 $\mu\text{g}/\text{m}^3$ 28 días [$\mu\text{g}/\text{m}^3$]	Clasificación CMR	LCI AgBB 2018 [$\mu\text{g}/\text{m}^3$]	Valor R
9	Ácidos							
9-1	Ácido acético	64-19-7	4.47	4			1200	0.00

+ Substancias identificadas y calibradas, substancias calculadas específicamente.

++ Clasificación según el reglamento (EC) N° 1272/2008: Categorías Carc. 1A y 1B, Muta. 1A y 1B, Repr. 1A y 1B, TRGS 905: K1 y K2, M1 y M2, R1 y R2, IARC: Grupo 1 y 2A, DFG (Lista MAK): Categoría III1 y III2

* Substancias no identificadas, calculadas como equivalente de tolueno referenciadas como los fragmentos másicos representativos expresados como relación masa/carga (m/z)

Tabla IX

Componentes carcinógenos, mutagénicos y tóxicos para la reproducción*	Concentración tras 28 días [$\mu\text{g}/\text{m}^3$]	SER _a [$\mu\text{g}/\text{m}^2\text{h}$]
CMR 1: VOC (incl. VVOC y SVOC) clasificados como: - Reglamento (EC) No. 1272/2008 en las siguientes categorías: Carc. 1A y 1B, Muta. 1A y 1B, Repr. 1A y 1B; - TRGS 905: K1, K2, M1, M2, R1, R2; - IARC: Grupo 1 y 2A; - DFG (lista MAK): Categorías III1, III2 (Suma)	< 1	< 10
C 1: VOC (incl. VVOC y SVOC) clasificados como: - Reglamento (EC) No. 1272/2008 en las siguientes categorías: Carc. 1A u. 1B, (Suma)	< 1	< 10

* Excluyendo el formaldehído (Carc. 1B) debido a que se assume un “valor límite práctico” por el que no se prevé un riesgo carcinogénico significativo (ver Federal Institute for Risk Assessment (2006): Toxicological evaluation of formaldehyde and Federal Environment Agency (2016): Reference value for formaldehyde in indoor air). En el caso de una evaluación de emisión toxicológica se necesita un análisis individual de la concentración de formaldehído. En opinión del comité para los valores guía de aire interior (Ausschuss für Innenraumrichtwerte) de la Agencia Federal de Medioambiente, no debería excederse, tampoco para un periodo corto de tiempo, la concentración de 0.1 mg formaldehído/m³ de aire interior, basada en la medida durante media hora (Bundesgesundheitsblatt 2016 · 59: 1040-1044 DOI 10.1007 / s00103 -016-2389-5 © Springer-Verlag Berlin Heidelberg 2016).

Tabla X

TVOC, Compuestos Orgánicos Volátiles Totales	Concentración tras 28 días [µg/m³]	SER_a [µg/m²h]
Suma de VOC según DIN EN 16516	< 5	< 50
Suma de VOC según AgBB 2018 / DIBt	< 5	< 50
Suma de VOC según eco-INSTITUT-Label	4	40
Suma de VOC según ISO 16000-6	10	100

Tabla XI

TSVOC, Compuestos Orgánicos Semivolátiles Totales	Concentración tras 28 días [µg/m³]	SER_a [µg/m²h]
Suma de SVOC según DIN EN 16516	< 5	< 50
Suma de SVOC sin LCI según AgBB 2018 / DIBt	< 5	< 50
Suma de SVOC sin LCI según eco-INSTITUT-Label	< 1	< 10
Suma de SVOC con LCI según AgBB 2018 / DIBt	< 5	< 50

Tabla XII

TVVOC Compuestos Orgánicos Muy Volátiles Totales	Concentración tras 28 días [µg/m³]	SER_a [µg/m²h]
Suma de VVOC según AgBB 2018 / DIBt y regulación belga	< 5	< 50
Suma de VVOC según eco-INSTITUT-Label	< 1	< 10

Tabla XIII

Suma de otros Compuestos Orgánicos Volátiles (VOC)	Concentración tras 28 días [µg/m³]	SER_a [µg/m²h]
Suma de otros VOC sin LCI según AgBB/DIBt y reglamento belga	< 5	< 50
Suma de otros VOC sin LCI según eco-INSTITUT-Label	< 1	< 10
CMR 2: VOC (incl. VVOC y SVOC) correspondientes a las categorías: - Reglamento (EC) No. 1272/2008: Categoría Carc. 2, Muta. 2, Repr. 2; - TRGS 905: K3; - IARC: Grupo 2B; - DFG (lista MAK): Categorías III3 (Suma)	< 1	< 10
Compuestos sensibilizantes categorizados como: DFG (lista MAK): Categoría IV, Lista German Federal Institute for Risk Assessment lists: Cat A, TRGS 907 (Suma)	< 1	< 10
Terpenos bicíclicos	< 1	< 10
C9 - C14: Alcanos / Isoalcanos expresado como equivalentes de decano (Suma)	< 1	< 10
C4-C11 aldehidos, acíclicos, alifáticos (Suma)	< 2	< 20
C9-C15 Bencenos alquilados (Suma)	< 1	< 10
Cresoles (Suma)	< 1	< 10

Tabla XIV

Valor de riesgo para evaluación de LCI	Valor R
Valor R según eco-INSTITUT-Label	0.00
Valor R según AgBB 2018 / DIBt	0.00
Valor R según regulación belga	0.00
Valor R según AFSSET	0.00

Nota:

Los valores de R pueden variar debido a los distintos requisitos de las distintas guías.

Para los compuestos carbonilos de cadena corta (C₁-C₅), que se cuantifican por HPLC según la norma DIN ISO 16000-3, no se especifica indicación del equivalente en tolueno. Por lo tanto estas sustancias se consideran con su cuantificación de sustancia-específica en el TVVOC según DIN EN 16516.

Evaluación de resultados:

El producto «**AQUALAC BRILLANTE**» que representa al grupo de pinturas «**AQUALAC BRILLANTE**», «**AQUALAC SATINADO**» y «**AQUALAC MATE**» se ha ensayado y se evalúa en base a los criterios de ensayo del esquema “Health-related Evaluation of Emissions of Volatile Organic Compounds (VVOC, VOC and SVOC) from Building Products” del comité para la evaluación de aspectos de salud de los productos de la construcción (AgBB 2018)

Tabla XV. Evaluación de resultados			
Parámetro de ensayo	Resultado	Requisito	Cumplimiento (Si/No)
Tiempo de medida: 3 días después de introducir el producto en la cámara			
Suma VOC (C6-C16) incluyendo SVOCs con LCI ⁽¹⁾	0,29 mg/m ³	≤ 10 mg/m ³	Si
Suma sustancias carcinógenas (EU cat. 1A y 1B)	<0,001 mg/m ³	≤ 10 mg/m ³	Si
Tiempo de medida: 28 días después de introducir el producto en la cámara			
Suma VOC (C6-C16) incluyendo SVOCs con LCI ⁽¹⁾	<0,005 mg/m ³	≤ 1 mg/m ³	Si
Suma SVOC sin LCI (C16-C22) ⁽¹⁾	<0,005 mg/m ³	≤ 0,1 mg/m ³	Si
Valor R-Wert (adimensional)	0,0	≤ 1	Si
Suma de VOC sin LCI	<0,005 mg/m ³	≤ 0,1 mg/m ³	Si
Suma sustancias carcinógenas (EU cat. 1A y 1B)	<0,001 mg/m ³	≤ 0,001 mg/m ³	Si

¹ Para la suma de VOC (C6-C16) y SVOCs (C16-C22) solo se consideran sustancias ≥5µg/m³

CONCLUSIONES

El producto «**AQUALAC BRILLANTE**» que representa al grupo de pinturas «**AQUALAC BRILLANTE**», «**AQUALAC SATINADO**» y «**AQUALAC MATE**» cumple los requisitos de emisiones del **esquema AgBB**.

ANEXO

Tecnalia Research & Innovation
Mikeletegi Pasealekua, 2
20009 Donostia - San Sebastian
ES

Test Report No. B 53782-001

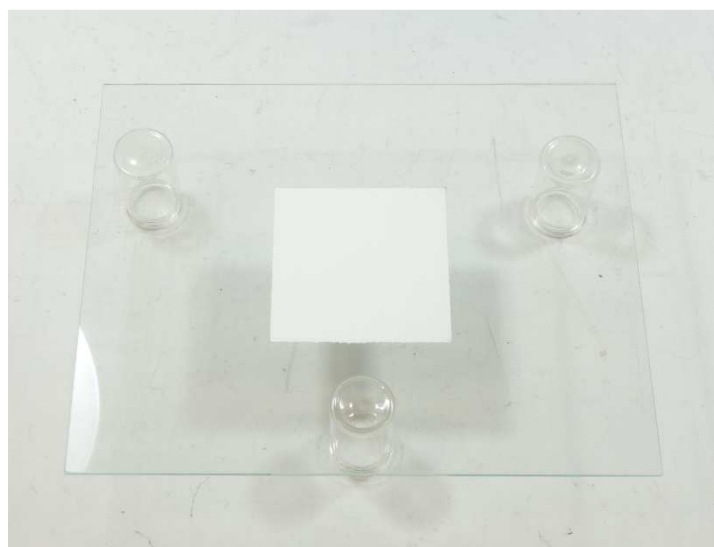
Test objective:	Evaluation according to AgBB-scheme 2018
Sample description by client:	AQUALAC BRILLANTE (Grupo 1) Tested as a representative for: - Aqualac brillante - Aqualac satinado - Aqualac mate
Sampled by:	INDUSTRIAS JUNO, S. A. Saconi, 10, 48950 Erandio (Bizkaia), Spain
Date of sampling:	05.11.2018
Location of sampling:	at the client
Date of production:	not specified
Date of arrival of sample:	15.11.2018
Test period:	15.11.2018 - 27.12.2018
Date of report:	02.01.2019
Number of pages of report:	17
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	AQUALAC BRILLANTE (Grupo 1)	without objection	Coating for doors and heaters



A001: AQUALAC BRILLANTE (Grupo 1)

Expert Evaluation

The product **AQUALAC BRILLANTE (Grupo 1)** has been tested on behalf of **Tecnalia Research & Innovation**.

This evaluation is based on the test criteria of the Scheme "Health-related Evaluation of Emissions of Volatile Organic Compounds (VOC, VOC and SVOC) from Building Products" of the Committee for Health-Related Evaluation of Building Products (AgBB 2018).

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

Test parameter	Result	Requirement	Requirement hold [yes/no]
Emission analysis			
Measurement time: 3 days after test chamber loading			
Sum VOC (C6-C16) including SVOC with LCI ¹⁾	0.29 mg/m ³	≤ 10 mg/m ³	yes
Sum carcinogenic substances (EU cat. 1A and 1B)	< 0.001 mg/m ³	≤ 0.01 mg/m ³	yes
Measurement time: 28 days after test chamber loading			
Sum VOC (C6-C16) including SVOC with LCI ¹⁾	< 0.005 mg/m ³	≤ 1 mg/m ³	yes
Sum SVOC without LCI (C16-C22) ¹⁾	< 0.005 mg/m ³	≤ 0.1 mg/m ³	yes
R-Wert (dimensionless)	0.0	≤ 1	yes
Sum VOC without LCI	< 0.005 mg/m ³	≤ 0.1 mg/m ³	yes
Sum carcinogenic substances (EU cat. 1A and 1B)	< 0.001 mg/m ³	≤ 0.001 mg/m ³	yes

1) for Sum VOC (C6-C16) and Sum SVOC (C16-C22) only substances ≥ 5 µg/m³ are considered

Summary evaluation

The product **AQUALAC BRILLANTE (Grupo 1)** meets the emission requirements of the AgBB-Scheme.

Cologne, 02.01.2019



Marc-Anton Dobaj, M.Sc. Crystalline Materials
(Project Manager)

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.

Laboratory report

1 Emission analysis

Test method

DIN EN 16516	Testing and evaluation of the release of dangerous substances; determination of emissions into indoor air
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A001, Preparation of test sample

Date:	16.11.2018
Pre-treatment:	Application on glass with a brush; application quantity 130 g/m ² ; drying / pre-conditioning outside of the test chamber 72 hours
Masking of backside:	not applicable
Masking of edges:	no
Relationship of unmasked edges to surface:	not applicable
Loading:	related to area
Dimensions:	7.9 cm x 7.9 cm [0.8g]

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

Chamber volume:	0.125 m ³
Temperature:	23°C ± 1°C
Relative humidity:	50 % ± 1 %
Air pressure:	normal
Air:	cleaned
Air change rate:	0.5 h ⁻¹
Air velocity:	0.3 m/s
Loading:	0.05 m ² /m ³
Specific air flow rate:	10 m ³ /(m ² · h)
Air sampling:	3 days after test chamber loading 28 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 (1,4-Cyclohexanedimethanol, Diethylene glycol, 1,4-Butanediol, Linalyl acetate, BIT: 5 µg/m ³)
Note for analysis:	not specified

1.1 Sample A001, Volatile Organic Compounds after 3 days

Test objective:

Volatile Organic Compounds (VOC), test chamber, air sampling 3 days after test chamber loading

Test result:

Sample: A001: AQUALAC BRILLANTE (Grupo 1)

No.	Substance	CAS No.	RT [min]	Concentration+ Substances ≥ 1 µg/m³ [µg/m³]	Toluene- equivalent Substances ≥ 5 µg/m³ [µg/m³]	CMR Classifi- cation++	LCI AgBB 2018 [µg/m³]	R- value
6	Glycols, Glycol ethers, Glycol esters							
6-1	Propylene glycol (1,2-Dihydroxypropane)	57-55-6	6.94	150	49		2100	0.07
6-5	Diethylene glycol- monobutylether	112-34-5	16.78	49	35		670	0.07
6-12	Dipropylene glycol monomethyl ether	34590-94-8	12.64+12.71	24	21		3100	0.01
6-42	3-Methoxy-1-butanol	2517-43-3	8.96	56	37		500	0.11
7	Aldehyde							
7-8	Decanal	112-31-2	7.15	2			900	0.00
9	Acids							
9-1	Acetic acid	64-19-7	4.48	8			1200	0.01
10	Esters							
10-12	2-Ethylhexyl acetate	103-09-3	15.80	1			350	0.00
13	Other identified substances in addition to LCI list							
	Hexamethylcyclotrisiloxane (D3)	541-05-9	8.35	2				
	m/z 69 55 83*		23-24	7	7			

+ 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: K1A, K1B, M1A, M1B, R1A, R1B; IARC: Group 1 and 2A, DFG MAK-list: Kategorie III1 and III2

* unidentified substances, calculated as toluene equivalent reported with significant mass fragments as mass-to-charge ratio (m/z)

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 3 days [µg/m³]	SERa [µg/(m² · h)]
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: K1A, K1B, M1A, M1B, R1A, R1B; IARC: Group 1 and 2A; DFG (MAK list): Categories III1, III2 (Sum)	< 1	< 10
C 1: VOC (incl. VVOC and SVOC) with the following categorisations: Regulation (EG) Nr. 1272/2008: Category Carc. 1A u. 1B (Sum)	< 1	< 10

TVOC, Total volatile organic compounds	Concentration after 3 days [µg/m³]	SERa [µg/(m² · h)]
Sum of VOC according to DIN EN 16516	150	1500
Sum of VOC according to AgBB 2018 / DIBt	290	2900
Sum of VOC according to eco-INSTITUT-Label	300	3000
Sum of VOC according to ISO 16000-6	200	2000

TSVOC, Total semi volatile organic compounds	Concentration after 3 days [µg/m³]	SERa [µg/(m² · h)]
Sum of SVOC according to DIN EN 16516	< 5	< 50
Sum of SVOC without LCI according to AgBB 2018 / DIBt	< 5	< 50
Sum of SVOC without LCI according to eco-INSTITUT-Label	< 1	< 10
Sum of SVOC with LCI according to AgBB 2018 / DIBt	< 5	< 50

TVVOC, Total very volatile organic compounds	Concentration after 3 days [µg/m³]	SERa [µg/(m² · h)]
Sum of VVOC according to AgBB 2018 / DIBt and Belgian regulation	< 5	< 50
Sum of VVOC according to eco-INSTITUT-Label	< 1	< 10

*Excluding formaldehyde (Carc. 1B) due to an assumed "practical threshold" under which a significant carcinogenic risk is no longer to be expected (see Federal Institute for Risk Assessment (2006): Toxicological evaluation of formaldehyde and Federal Environment Agency (2016): Reference value for formaldehyde in indoor air). In the case of a toxicological emission assessment, a single-substance analysis of the formaldehyde concentration is necessary.
 In the opinion of the committee for Indoor Air Guide Values (Ausschuss für Innenraumrichtwerte) of the Federal Environment Agency, the concentration of 0.1 mg formaldehyde/m³ indoor air, based on a measurement period of half an hour, should not be exceeded, also for a short time (Bundesgesundheitsblatt 2016 · 59: 1040-1044 DOI 10.1007 / s00103 - 016-2389-5 © Springer-Verlag Berlin Heidelberg 2016).

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 3 days [µg/m³]	SERa [µg/(m² · h)]
VOC without LCI according to AgBB/DIBt and Belgian regulation (Sum)	7	70
VOC without LCI according to eco-INSTITUT-Label (Sum)	9	90
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)	< 1	< 10
Sensitising compounds with the following categorisations: DFG (MAK list): Category IV, German Federal Institute for Risk Assessment lists: Cat A, TRGS 907 (Sum)	< 1	< 10
Bicyclic Terpenes (sum)	< 1	< 10
C9 - C14: Alkanes / Isoalkanes as dekane-equivalent (Sum)	< 1	< 10
C4 - C11 Aldehydes, acyclic, aliphatic (Sum)	2	20
C9 - C15 Alkylated benzenes (Sum)	< 1	< 10
Cresols (Sum)	< 1	< 10

Risk value for assessment of LCI	R-value
R-value according to eco-INSTITUT-Label	0.28
R-value according to AgBB 2018 / DIBt	0.27
R-value according to Belgian regulation	0.27
R-value according to AFSSET	1.62

Note:

Due to different requirements in the respective guidelines, the calculation of TVOC, TVVOC, TSVOC and R-value may result in different values.

For short-chain carbonyl compounds (C₁-C₅), which are quantified by HPLC according to DIN ISO 16000-3, no indication of the toluene equivalent is specified. Therefore, these substances are considered with their substance-specific Quantification in the TVVOC acc. DIN EN 16516.

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 28 days

Test objective:

Volatile Organic Compounds (VOC), test chamber, air sampling 28 days after test chamber loading

Test result:

Sample: A001: AQUALAC BRILLANTE (Grupo 1)

No.	Substance	CAS No.	RT [min]	Concentration+ Substances ≥ 1 µg/m³ [µg/m³]	Toluene- equivalent Substances ≥ 5 µg/m³ [µg/m³]	CMR Classifi- cation++	LCI AgBB 2018 [µg/m³]	R-value
9	Acids							
9-1	Acetic acid	64-19-7	4.47	4			1200	0.00

+ 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: K1A, K1B, M1A, M1B, R1A, R1B; IARC: Group 1 and 2A, DFG MAK-list: Kategorie III1 and III2

* unidentified substances, calculated as toluene equivalent reported with significant mass fragments as mass-to-charge ratio (m/z)

Carcinogenic, mutagenic and reproductive toxic components*	Concentration after 28 days [µg/m³]	SERa [µg/(m² · h)]
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: K1A, K1B, M1A, M1B, R1A, R1B; IARC: Group 1 and 2A; DFG (MAK list): Categories III1, III2 (Sum)	< 1	< 10
C 1: VOC (incl. VVOC and SVOC) with the following categorisations: Regulation (EG) Nr. 1272/2008: Category Carc. 1A u. 1B (Sum)	< 1	< 10

TVOC, Total volatile organic compounds	Concentration after 28 days [µg/m³]	SERa [µg/(m² · h)]
Sum of VOC according to DIN EN 16516	< 5	< 50
Sum of VOC according to AgBB 2018 / DIBt	< 5	< 50
Sum of VOC according to eco-INSTITUT-Label	4	40
Sum of VOC according to ISO 16000-6	10	100

TSVOC, Total semi volatile organic compounds	Concentration after 28 days [µg/m³]	SERa [µg/(m² · h)]
Sum of SVOC according to DIN EN 16516	< 5	< 50
Sum of SVOC without LCI according to AgBB 2018 / DIBt	< 5	< 50
Sum of SVOC without LCI according to eco-INSTITUT-Label	< 1	< 10
Sum of SVOC with LCI according to AgBB 2018 / DIBt	< 5	< 50

TVVOC, Total very volatile organic compounds	Concentration after 28 days [µg/m³]	SERa [µg/(m² · h)]
Sum of VVOC according to AgBB 2018 / DIBt and Belgian regulation	< 5	< 50
Sum of VVOC according to eco-INSTITUT-Label	< 1	< 10

*Excluding formaldehyde (Carc. 1B) due to an assumed "practical threshold" under which a significant carcinogenic risk is no longer to be expected (see Federal Institute for Risk Assessment (2006): Toxicological evaluation of formaldehyde and Federal Environment Agency (2016): Reference value for formaldehyde in indoor air). In the case of a toxicological emission assessment, a single-substance analysis of the formaldehyde concentration is necessary.
 In the opinion of the committee for Indoor Air Guide Values (Ausschuss für Innenraumrichtwerte) of the Federal Environment Agency, the concentration of 0.1 mg formaldehyde/m³ indoor air, based on a measurement period of half an hour, should not be exceeded, also for a short time (Bundesgesundheitsblatt 2016 · 59: 1040-1044 DOI 10.1007 / s00103 - 016-2389-5 © Springer-Verlag Berlin Heidelberg 2016).

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 28 days [µg/m³]	SERa [µg/(m² · h)]
VOC without LCI according to AgBB/DIBt and Belgian regulation (Sum)	< 5	< 50
VOC without LCI according to eco-INSTITUT-Label (Sum)	< 1	< 10
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)	< 1	< 10
Sensitising compounds with the following categorisations: DFG (MAK list): Category IV, German Federal Institute for Risk Assessment lists: Cat A, TRGS 907 (Sum)	< 1	< 10
Bicyclic Terpenes	< 1	< 10
C9 - C14: Alkanes / Isoalkanes as dekane-equivalent (Sum)	< 1	< 10
C4 - C11 Aldehydes, acyclic, aliphatic (Sum)	< 2	< 20
C9 - C15 Alkylated benzenes (Sum)	< 1	< 10
Cresols (Sum)	< 1	< 10

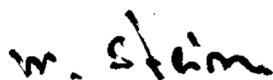
Risk value for assessment of LCI	R-value
R-value according to eco-INSTITUT-Label	0.00
R-value according to AgBB 2018 / DIBt	0.00
R-value according to Belgian regulation	0.00
R-value according to AFSSET	0.00

Note:

Due to different requirements in the respective guidelines, the calculation of TVOC, TVVOC, TSVOC and R-value may result in different values.

For short-chain carbonyl compounds (C₁-C₅), which are quantified by HPLC according to DIN ISO 16000-3, no indication of the toluene equivalent is specified. Therefore, these substances are considered with their substance-specific Quantification in the TVVOC acc. DIN EN 16516.

Cologne, 02.01.2019



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

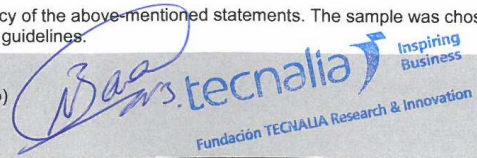
Remark: The test result referred to the submitted test sample exclusively. The validity of the report is three years at most and will end immediately at any alternation of material composition or in manufacturing process. Publishing in parts requires authorisation.

Appendix

I Sampling sheet

Produktprüfung Product testing Zertifizierung Certification Beratung Consulting	53782-001	eco INSTITUT
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Sampling Sheet*

Testing laboratory	eco-INSTITUT Germany GmbH Schanzenstr. 6-20, D-51063 Cologne Germany Tel. +49 (0)221 - 931245-0 Fax +49 (0)221 - 931245-33	Sampler (Name, Company, Phone number)	Same as manufacturer.
Name of manufacturer / distributor at place of sampling (Address / Stamp)	INDUSTRIAS JUNO, S.A. Saconi, 10 48950 Erandio (Bizkaia)	Customer/ Invoice recipient (if different from manufacturer)	TECNALIA CIF: G48975767 Parque Científico y Tecnológico de Bizkaia C/Geldo, Edificio 700 E-48160 Derio (Bizkaia) Spain
Product name	2 Products. Each of them covering the commercial references stated in the attached certificate - Reference: AQUALAC BRILLANTE (Grupo 1) - Reference: JUNOPROF MATE (Grupo 2)	Product type (e.g. parquet, floor covering)	Grupo 1: coating for doors and heaters Grupo 2: coating for walls and ceilings
Model / programme / series	--	Batch	--
Article number	--	Production date of batch	--
Samples are taken from	☐ current production ☒ storage	Sampling date	05.11.18
Storage location before sampling	☐ in production ☒ storage ☐ other	Storage conditions before sampling	☐ open ☒ packaged
Storage location:	Manufacturer location	Packaging material:	Plastic and cupboard
Special features (possible negative effects through emissions at place of sampling (e.g. benzine, exhaust fumes), unclarities, questions etc.)	Applique rate: AQUALAC BRILLANTE (Grupo 1): 130gr/m2 JUNOPROF MATE (Grupo 2): 176gr/m2		
Validation Hereby the signer affirms the accuracy of the above-mentioned statements. The sample was chosen, sampled and packaged according to the sampling guidelines.			
Date: 07.11.18	Signature: (Company stamp)   Inspiring Business Fundación TECNALIA Research & Innovation		

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

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 DIN EN 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: K1A, K1B, M1A, M1B, R1A, R1B 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 $< \text{C}_6$
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 DIN EN 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 2018
R value according to AgBB 2018/DIBt	R value for all identified and calibrated VOC $\geq 5 \mu\text{g}/\text{m}^3$ with LCI, established by the AgBB in 2018
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 calibrated 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-2-methylbenzene
 1-Isopropyl-4-methylbenzene
 1,2,4,5-Tetramethylbenzene
 n-Butylbenzene
 1,3-Diisopropylbenzene
 1,4-Diisopropylbenzene
 Phenyltoluene
 1-Phenyldecane²
 1-Phenylundecane²
 4-Phenylcyclohexene
 Styrene
 β-Methylstyrene
 Phenylacetylene
 2-Phenylpropene
 Vinyltoluene
 Naphthalene
 Indene
 Benzene
 1-Methylnaphthalene
 2-Methylnaphthalene
 1,4-Dimethylnaphthalene
 3-Propyltoluene
 2-Propyltoluene

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
 n-Hexadecane
 Methylcyclopentane
 1,4-Dimethylcyclohexane
 2,2,4,6,6-Pentamethylheptane

Terpenes

δ-3-Carene
 α-Pinene
 β-Pinene

Limonene
 Longifolene
 β-Caryophyllene
 α-Phellandrene
 Myrcene
 Camphene
 α-Terpinene
 Longipinene
 trans-β-Farnesene
 cis-β-Farnesene
 Isolongifolene

Aliphatic alcohols and ether

1-Propanol¹
 2-Propanol¹
 1-Butanol
 1-Pentanol
 1-Hexanol
 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-Cyclohexanedimethanol

Aromatic alcohols (phenoles)

Phenol
 BHT (2,6-Di-tert-butyl-4-methylphenol)
 Benzyl alcohol
 Cresols

Glycols, Glycol ether, Glycol ester

Propyleneglycol (1,2-Dihydroxypropane)
 Ethyleneglycol (Ethandiol)
 Ethylene glycol monobutyl ether
 Diethylene glycol
 Diethylene glycol-monobutyl ether
 2-Phenoxyethanol
 Ethylene carbonate
 1-Methoxy-2-propanol
 2-Methoxy-1-propanol
 2-Methoxy-1-propyl acetate
 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-methoxy-ethoxy)ethane
 Propylene glycol diacetate

Dipropylene glycol
 Dipropylene glycol monomethylether
 acetate
 Dipropylene glycol n-butylether
 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)
 Ethyldiglycol
 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
 2-Butoxy ethyl acetate

Aldehydes

Butanal^{1,3}
 3-Methyl-1-butanal
 Pentanal³
 Hexanal
 Heptanal
 2-Ethylhexanal
 Octanal
 Nonanal
 Decanal
 2-Butenal³
 2-Pentenal³
 2-Hexenal
 2-Heptenal
 2-Octenal
 2-Nonenal
 2-Decenal
 2-Undecenal
 Furfural
 Ethanedial (Glyoxal)^{1,3}
 Glutaraldehyde
 Benzaldehyde
 Acetaldehyde^{1,3}
 Formaldehyde^{1,3}
 Propanal^{1,3}
 Propenal^{1,3}
 Isobutenal³

Ketones

Ethylmethylketone³
 3-Methyl-2-butanone
 Methylisobutylketone
 Cyclopentanone
 Cyclohexanone
 Acetone^{1,3}
 2-Methylcyclopentanone
 2-Methylcyclohexanone

Acetophenone
 1-Hydroxyacetone
 2-Heptanon

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
 Dipropylenglycoldiacrylate

Chlorinated hydrocarbons

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

Others

1,4-Dioxane
 Caprolactam
 N-Methyl-2-pyrrolidone
 Octamethylcyclotetrasiloxane
 Hexamethylcyclotrisiloxane
 Methenamine
 2-Butanoxime
 Triethyl phosphate
 Tributyl phosphate
 5-Chlor-2-methyl-4-isothiazolin-3-one (CIT)
 2-Methyl-4-isothiazolin-3-one (MIT)
 Triethylamine
 Decamethylcyclopentasiloxane

Dodecamethylcyclohexasiloxane
 Tetrahydrofuran (THF)
 1-Decene
 Benzothiazole
 1-Octene
 2-Pentylfuran
 2-Methylfuran
 Isophorone
 Tetramethyl succinonitrile
 Dimethylformamide (DMF)
 Tributyl phosphate
 N-Ethyl-2-pyrrolidone
 Aniline
 4-Vinylcyclohexene
 Dimethoxymethane
 Dichlormethane
 Carbon tetrachloride
 trans-Decahydronaphthalene
 cis-Decahydronaphthalene
 Linalyl acetate
 Chloroform
 Chloroprene (monomer)
 Acetamide
 Formamide
 1,3-Dichlor-2-propanol
 2-n-Octyl-4-isothiazolin-3-one (OIT)
 1,2-Benzylisothiazolin-3-one (BIT)

- 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 signal of the internal standard d8 toluene. As far as possible, identification and quantification limit of any substance shall be 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 DIN EN 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.

$$SER = q \cdot c$$

- 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.