

INFORME No.: 092429-2

CLIENTE:	INDUSTRIAS TITAN, S.A.U.
PERSONA DE CONTACTO:	Virginia Sánchez
DIRECCIÓN:	Pol. Ind. Pratense, calle 114, nº 21-23 08820 El Prat de Llobregat (Barcelona)
OBJETO:	Emisión de VOCs, clasificación según legislación francesa de VOC
MUESTRA ENSAYADA:	«BIOLUX»
FECHA DE RECEPCION:	02.02.2021
FECHAS DE ENSAYO:	08.02.2021 a 18.03.2021
FECHA DE EMISIÓN:	29.03.2021



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

* Los resultados del presente informe conciernen, única y exclusivamente al material ensayado.

* Este informe no podrá ser reproducido sin la autorización expresa de FUNDACIÓN TECNALIA R&I, excepto cuando lo sea de forma íntegra.

⁽¹⁾ Información aportada por el cliente. FUNDACIÓN TECNALIA R&I no se hace responsable de la información aportada por el cliente.

CARACTERISTICAS DE LAS MUESTRAS

Con fecha 02.02.2021 se recibió en Fundación Tecnia R&I por parte de la empresa **“INDUSTRIAS TITAN, S.A.U.”** una muestra referenciada como⁽¹⁾:

- «BIOLUX»

ENSAYOS SOLICITADOS

Los ensayos solicitados son los siguientes:

- ♦ Ensayo de emisión de VOC's (Compuestos orgánicos volátiles) según la norma ISO 16000-6:2012 para establecer una clasificación según los criterios establecidos en el decreto Nº 2011-321 del 23 de marzo de 2011 del Ministerio Francés de Ecología, Desarrollo Sostenible, Transporte y Vivienda. Los ensayos se han realizado en el laboratorio acreditado “eco-INITIUT” cuyo informe original se adjunta como Anexo I.

ENSAYOS REALIZADOS

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

- Condiciones de la cámara de ensayo según la norma ISO 16000-9:2008
 - Volumen: 0.125m³
 - Temperatura y humedad relativa: 23°C al 50% HR.
 - Presión: atmosférica
 - Renovación del aire: 0,5 h⁻¹

La determinación de las emisiones de VOC's para establecer una clasificación según los criterios establecidos en el decreto Nº 2011-321 del 23 de marzo de 2011 del Ministerio Francés de Ecología, Desarrollo Sostenible, Transporte y Vivienda, se ha desarrollado según indican las normas ISO 16000-3:2013 e ISO 16000-6:2012. La preparación de las probetas de ensayo se ha realizado según la norma ISO 16000-11:2006 y un periodo de acondicionamiento fuera de la cámara de ensayo de 72 horas.

El límite de detección de las técnicas empleadas es de 1 µg/m³.

RESULTADOS

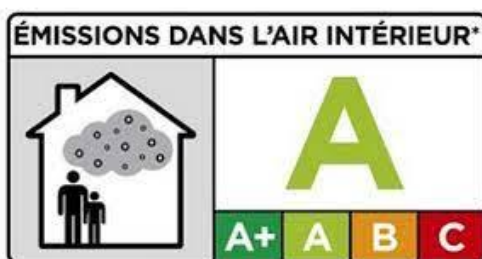
Los resultados obtenidos y los valores de referencia establecidos en el decreto N° 2011-321 del 23 de marzo de 2011 del Ministerio Francés de Ecología, Desarrollo Sostenible, Transporte y Vivienda se muestran en la tabla I:

Tabla I – Regulación VOC

Ref.: «BIOLUX» Sustancias (Análisis de emisiones)	Concentración (aire en la cámara de ensayo) [µg/m³] tras 28 días	Clases			
		A+	A	B	C
Formaldehído	34	<10	<60	<120	>120
Acetaldehído	3	<200	<300	<400	>400
Tolueno	<1	<300	<450	<600	>600
Tetracloroetileno	<1	<250	<350	<500	>500
Xileno	<1	<200	<300	<400	>400
1,2,4-Trimetilbenceno	<1	<1000	<1500	<2000	>2000
1,4-Diclorobenceno	<1	<60	<90	<120	>120
Etilbenceno	<1	<750	<1000	<1500	>1500
2-Butoxyetanol	<1	<1000	<1500	<2000	>2000
Estireno	<1	<250	<350	<500	>500
TVOC	800	<1000	<1500	<2000	>2000

CONCLUSIONES

El producto denominado «BIOLUX» cumple los requisitos de la **Clase A** del decreto N° 2011-321 del 23 de marzo de 2011 del Ministerio Francés de Ecología, Desarrollo Sostenible, Transporte y Vivienda. Por lo tanto, en base a los resultados obtenidos, el producto queda clasificado con el siguiente distintivo correspondiente a la clasificación A según la legislación mencionada:



ANEXO

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

Test Report No. 56076-002-FVO-L

Test objective:	Evaluation according to French VOC-regulation
Name of test sample/item by client:	BIOLUX
Sample/batch by client:	no information
Sampled by:	INDUSTRIAS TITAN, S.A.U, 08820 Prat de Llobregat, Barcelona
Date of sampling:	02.02.2021
Location of sampling:	INDUSTRIAS TITAN, S.A.U, 08820 Prat de Llobregat, Barcelona
Date of production:	no information
Date of arrival of sample:	08.02.2021
Test period:	08.02.2021 - 18.03.2021
Date of report:	22.03.2021
Number of pages of report:	15
Testing laboratory:	eco-INSTITUT Germany GmbH, Cologne except ‡ subcontracted # outside accreditation
Test objective fulfilled:	✓ Class A

Note:

The test results in the report refer exclusively to the test sample submitted by the manufacturer. The report is not permitted to be used in product and company advertising. The report may be published in full as technical documentation on the Internet with the written consent of eco-INSTITUT Germany GmbH. eco-INSTITUT Germany GmbH has recommended that the manufacturer repeats the test after 3 years at the latest. More information at www.eco-institut.de/en/advertising

Content

Sample View	3
Statement of conformity with VOC-regulation	4
Summary statement of conformity with VOC-regulation	5
Déclaration de conformité avec les critères du COV décret.....	6
Résumé de la déclaration de conformité	7
Laboratory report.....	8
1 Emission analysis.....	8
1.1 Sample A002, Volatile Organic Compounds after 28 days.....	9
Appendix.....	11
Sampling sheet.....	11
Definition of terms.....	12
Commentary on emission analysis.....	14
Explanation of Specific Emission Rate SER	15

Sample View

Internal sample number (assigned by the laboratory)	Test sample/item by client	Sample/batch by client	Condition upon delivery	Type of sample
56076-A002	BIOLUX	no information	without objection	for decoration and protection of facades and single-layer mortars (interior and exterior)



56076-A002

Statement of conformity with VOC-regulation

The sample with the internal sample number 56076-A002 has been tested on behalf of **Tecnalia Research & Innovation**. The article description according to the customer is **BIOLUX**.

This evaluation bases on the test criteria of the decree no. 2011-321 of March 23rd, 2011 (VOC regulation) of the French Ministry of Ecology, Sustainable Development, Transport and Housing.

The results documented in the test report were evaluated as follows.¹

VOC regulation

Emission analysis	Concentration (Test chamber air) [µg/m³]	Class			
Substance	after 28 days	C	B	A	A+
Formaldehyde	34	> 120	< 120	< 60	< 10
Acetaldehyde	3	> 400	< 400	< 300	< 200
Toluene	< 1	> 600	< 600	< 450	< 300
Tetrachlorethylene	< 1	> 500	< 500	< 350	< 250
Xylene	< 1	> 400	< 400	< 300	< 200
1,2,4-Trimethylbenzene	< 1	> 2000	< 2000	< 1500	< 1000
1,4-Dichlorbenzene	< 1	> 120	< 120	< 90	< 60
Ethylbenzene	< 1	> 1500	< 1500	< 1000	< 750
2-Butoxyethanol	< 1	> 2000	< 2000	< 1500	< 1000
Styrene	< 1	> 500	< 500	< 350	< 250
TVOC _{tol}	800	> 2000	< 2000	< 1500	< 1000

¹ If a measurement result that slightly exceeds the specification is assessed as “not fulfilled”, this is based on the agreement of the “shared risk of measurement uncertainty (shared risk approach)”. According to this, the probability that the statement is correct is $\geq 50\%$. Similarly, a result slightly below the specification value also only has a probability of $\geq 50\%$ of being compliant. I.e., the risk of making a false negative statement regarding the fulfilment of the specification is just as high as the risk of making a false positive statement (more information at https://www.eco-institut.de/en/2019/07/measurement_uncertainty/).

Summary statement of conformity with VOC-regulation

The sample with the internal sample number 56076-A002, article description according to customer: **BIOLUX**, meets the requirements of the **Class A** of the decree no. 2011-321 of March 23, 2011 (VOC regulation) of the French Ministry of Ecology, Sustainable Development, Transport and Housing.

Cologne, 22.03.2021

A handwritten signature in black ink, reading "M. A. Dobaj", with a long, sweeping flourish extending from the end.

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

Déclaration de conformité avec les critères du COV décret

L'échantillon avec le numéro d'échantillon interne 56076-A002 a été testé sous la responsabilité du **Tecnia Research & Innovation**. La description de l'article selon le client est **BIOLUX**.

Cette évaluation est basée sur les critères du décret n° 2011-321 du 23 mars 2011 (COV décret) par le Ministère de l'écologie, du développement durable, des transports et du logement.

Les résultats documentés dans le rapport du test sont évalués comme suit.²

COV décret

Analyse des émissions	Concentration (air de la chambre d'essai) [µg/m³]	Classe			
Substance	au bout de 28 jours	C	B	A	A+
Formaldéhyde	34	> 120	< 120	< 60	< 10
Acétaldéhyde	3	> 400	< 400	< 300	< 200
Toluène	< 1	> 600	< 600	< 450	< 300
Tétrachloréthylène	< 1	> 500	< 500	< 350	< 250
Xylène	< 1	> 400	< 400	< 300	< 200
1,2,4-Triméthylbenzène	< 1	> 2000	< 2000	< 1500	< 1000
1,4-Dichlorobenzène	< 1	> 120	< 120	< 90	< 60
Ethylbenzène	< 1	> 1500	< 1500	< 1000	< 750
2-Butoxyéthanol	< 1	> 2000	< 2000	< 1500	< 1000
Styrène	< 1	> 500	< 500	< 350	< 250
COVT_{tot}	800	> 2000	< 2000	< 1500	< 1000

² Si un résultat de mesure dépasse légèrement les exigences et est évalué "non conforme", cette évaluation se base sur l'accord du "risque partagé d'incertitude de mesure (Shared Risk-Ansatz)". La probabilité que la déclaration soit correcte est ensuite $\geq 50\%$. De même, un résultat légèrement inférieur à la valeur requise n'est conforme qu'avec une probabilité de $\geq 50\%$. Cela signifie que le risque de faire une fausse déclaration négative pour satisfaire à l'exigence est aussi élevé que le risque de faire une fausse déclaration positive (plus d'informations sur https://www.eco-nstitut.de/en/2019/07/measurement_uncertainty/).

Résumé de la déclaration de conformité

L'échantillon avec le numéro d'échantillon interne 56076-A002, description de l'article selon le client : **BIOLUX**, correspond aux exigences de la **classification A** sur les critères du décret n° 2011-321 du 23 mars 2011 (COV décret) par le Ministère de l'écologie, du développement durable, des transports et du logement.

Cologne, 22.03.2021

A handwritten signature in black ink, reading "M.-A. Dobaj", with a long, sweeping flourish extending to the right.

Marc-Anton Dobaj, M.Sc. Crystalline Materials
(chef de projet)

Laboratory report

1 Emission analysis

Test method

DIN EN 16516:2018-01

Testing and evaluation of the release of dangerous substances;
determination of emissions into indoor air

A002, Preparation of test sample

Date:

12.02.2021

Sample preparation:

On the basis of „Liste indicative des produits entrant dans le champ d'application du décret n° 2011321 du 23 mars 2011“ according to ISO 16000-11 and/or technical datasheet; Application on glass with a brush; application quantity 533 g/m²; 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:

2 x [25 cm x 25 cm] each 33.3 g

A002, Test chamber conditions according to DIN ISO 16000-9:2008-04

Chamber volume:

0.125 m³

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:

1.0 m³/m³

Specific air flow rate:

0.5 m³/(m² · h)

Air sampling:

28 days after test chamber loading

Analytics

Aldehydes and Ketones

DIN ISO 16000-3:2013-01

Limit of determination:

2 µg/m³

Volatile Organic Compounds

DIN ISO 16000-6:2012-11

Limit of determination:

1 µg/m³ (1,4-Cyclohexanedimethanol, Diethylene glycol, 1,4-Butanediol: 5 µg/m³)

Note for analysis:

not specified

1.1 Sample A002, Volatile Organic Compounds after 28 days

Test objective:

Volatile Organic Compounds according to „Arrêté du 19 avril 2011 relatif à l'étiquetage des produits de construction ou de revêtement de mur ou de sol et des peintures et vernis sur leurs émissions de polluants volatils“ (french VOC-regulation, 10 substances), test chamber, air sampling 28 days after test chamber loading

Test result:

Internal sample number: | 56076-A002

No.	Substance	CAS No.	RT [min]	Concentration+ (test chamber air) Substances ≥ 1 µg/m³ 28 days [µg/m³]	Toluene- equivalent Substances ≥ 5 µg/m³ 28 days [µg/m³]
1	Aromatic hydrocarbons				
1-1	Toluene	108-88-3		< 1	< 5
1-2	Ethyl benzene	100-41-4		< 1	< 5
1-3	Xylene, mix of o-, m- and p-xylene isomers	1330-20-7		< 1	< 5
1-4	p-Xylene (including m-Xylol)	106-42-3		< 1	< 5
1-6	o-Xylene	95-47-6		< 1	< 5
1-11	1.2.4-Trimethylbenzene	95-63-6		< 1	< 5
1-25	Styrene	100-42-5		< 1	< 5
6	Glycols, Glycol ethers, Glycol esters				
6-3	Ethylene glycol-monobutylether (2-Butoxyethanol)	111-76-2		< 1	< 5
7	Aldehyde				
7-20	Acetaldehyde	75-07-0		3	n.d.
7-22	Formaldehyde	50-00-0		34	n.d.
13	Other identified substances in addition to LCI list				
	Benzene	71-43-2		< 1	< 5
	1,4-Dichlorobenzene	106-46-7		< 1	< 5
	Trichlorethene	79-01-6		< 1	< 5
	Tetrachloroethene	127-18-4		< 1	< 5

+ identified and calibrated substances, substance specific calculated
 n.d. = not determinable

TVOC, Total volatile organic compounds	Concentration after 28 days [µg/m³]	SERa [µg/(m² · h)]
Sum of VOC according to ISO 16000-6	800	400

Cologne, 22.03.2021



Michael Stein, Dipl.-Chem.
(Laboratory Manager)

Appendix

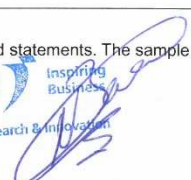
Sampling sheet

Produktprüfung Product testing
Zertifizierung Certification
Beratung Consulting

56076-001-002

eco
INSTITUT

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 TITAN, S.A.U Ind. Pratense, C/114 n° 21-23 08820 PRAT DE LLOBREGAT, BARCELONA	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	- TITANIT MATE - BIOLUX	Product type (e.g. parquet, floor covering)	- TITANIT MATE: interior walls and ceilings - BIOLUX: for decoration and protection of facades and single-layer mortars (interior and exterior)
Model / programme / series	--	Batch	--
Article number	--	Production date of batch	--
Samples are taken from	☐ current production ☒ storage	Sampling date	02.02.21
Storage location before sampling	☐ in production ☒ storage ☐ other	Storage conditions before sampling	☐ open ☒ packaged
Storage location:	Manufacturer location	Packaging material:	Plastic
Special features (possible negative effects through emissions at place of sampling (e.g. benzine, exhaust fumes), unclarities, questions etc.)		Application rate: - TITANIT MATE: 173,61gr/m2. - BIOLUX: 533,33gr/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: 04.02.21 Signature:  (Company stamp)  Inspiring Business Fundación TECNALIA Research & Innovation			

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

eco-INSTITUT Germany GmbH / Schanzenstrasse 6-20 / Cityport Kuppelzug 12 / D-51063 Cologne - Germany
Tel. +49 (0)221 931245-0 / Fax +49 (0)221 931245-33 / eco-institut.de / geo@eco-institut.de / eco@eco-institut.de
HRB 17417 - USt-ID: DE 253713922 / eco-INSTITUT GmbH / 5065 0600156216770190000000 / 12.10.2014-01

DAKKS
Deutscher
Akkreditierungsstelle
D-50-15117-01-001

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 16516:2018-01	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 16000-6:2012-11	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 $< C_6$
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 16516:2018-01	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 "Explanation of Specific Emission Rate SER")
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

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 from 1 µg/m³.

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 standard d8 toluene. The identification and quantification of substances is carried out, as far as technically feasible, from a concentration (evaluation limit) of 5 µg/m³ test chamber air.

Quality assurance

The eco-INSTITUT Germany GmbH is granted flexible scope of accreditation pursuant to DIN EN ISO/IEC 17025:2018-03. 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 16516:2018-01. 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.

The expanded measurement uncertainty U for the analytical determination of all volatile organic compounds, including the test chamber method, is estimated to 41.7 %. The calculation is based on DIN ISO 11352:2013-03 (Nordtest).

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.