

## INFORME No.: 083198-2

|                             |                                                                                   |
|-----------------------------|-----------------------------------------------------------------------------------|
| <b>CLIENTE:</b>             | INDUSTRIAS TITAN, S.A.U.                                                          |
| <b>PERSONA DE CONTACTO:</b> | Virginia Sánchez                                                                  |
| <b>DIRECCIÓN:</b>           | Pol. Ind. Pratense, calle 114, nº 21-23<br>08820 El Prat de Llobregat (Barcelona) |
| <b>OBJETO:</b>              | Emisión de VOCs, clasificación según legislación francesa de VOC                  |
| <b>MUESTRA ENSAYADA:</b>    | BARNIZ AL AGUA ECOLÓGICO DECORACIÓN SATINADO, Código de producto: M21             |
| <b>FECHA DE RECEPCION:</b>  | 31.07.2019                                                                        |
| <b>FECHAS DE ENSAYO:</b>    | 31.07.2019 a 17.09.2019                                                           |
| <b>FECHA DE EMISIÓN:</b>    | 26.09.2019                                                                        |



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.

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## CARACTERÍSTICAS DE LAS MUESTRAS

Con fecha 31.07.2019 se recibió en Fundación Tecnalia R&I por parte de la empresa **“INDUSTRIAS TITAN, S.A.U.”** una muestra referenciada como:

- BARNIZ AL AGUA ECOLÓGICO DECORACIÓN SATINADO, Código de producto: M21

## 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 decreto N° 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-INSTITUT” cuyo informe original se adjunta como Anexo I.

## ENSAYOS REALIZADOS

El ensayo se ha realizado en una cámara con las siguientes condiciones, según la norma ISO 16000-9:

- Condiciones de la cámara de ensayo
  - Volumen: 0.125m<sup>3</sup>
  - Temperatura y humedad relativa: 23°C al 50% HR.
  - Presión: atmosférica
  - Renovación del aire: 0,5 h<sup>-1</sup>

La determinación de las emisiones de VOC's para establecer una clasificación según los criterios establecidos en el decreto N° 2011-321 del 23 de marzo de 2011 del Ministerio Francés de Ecología, Desarrollo Sostenible, Transporte y Vivienda, se ha desarrollado según indica la norma EN 16516. La muestra se aplica según indicaciones del fabricante y se realiza un acondicionamiento previo fuera de cámara de 72 horas.

Las analíticas se realizan según ISO 16000-3 y 16000-6.

El límite de detección de las técnicas empleadas es de 1 µg/m<sup>3</sup>.

## RESULTADOS

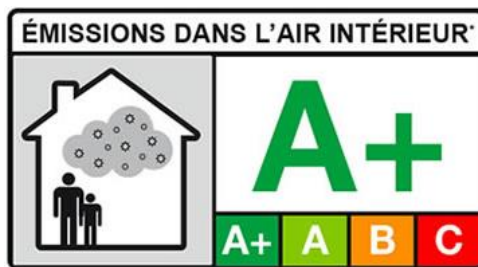
Los resultados obtenidos y los valores de referencia establecidos en el decreto N° 2011-321 del 23 de marzo de 2011 del Ministerio Francés de Ecología, Desarrollo Sostenible, Transporte y Vivienda se muestran en la tabla I:

**Tabla I – Regulación VOC**

| Ref.: BARNIZ AL AGUA<br>ECOLÓGICO<br>DECORACIÓN<br>SATINADO, Código de<br>producto: M21 | Concentración<br>(aire en la cámara de<br>ensayo)<br>[µg/m³] tras 28 días | Clases          |                 |                 |                 |
|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-----------------|-----------------|-----------------|-----------------|
|                                                                                         |                                                                           | A+              | A               | B               | C               |
| Sustancias (Análisis de<br>emisiones)                                                   |                                                                           |                 |                 |                 |                 |
| Formaldehído                                                                            | <2                                                                        | <10             | <60             | <120            | >120            |
| Acetaldehído                                                                            | <2                                                                        | <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            |
| <b>TVOC</b>                                                                             | 10                                                                        | <b>&lt;1000</b> | <b>&lt;1500</b> | <b>&lt;2000</b> | <b>&gt;2000</b> |

## CONCLUSIONES

El producto denominado *BARNIZ AL AGUA ECOLÓGICO DECORACIÓN SATINADO*, Código de producto: M21 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  
ES

## Test Report No. B 54508-004

This test report replaces the test report 54508-004 from 17.09.2019.

|                                      |                                                                                         |
|--------------------------------------|-----------------------------------------------------------------------------------------|
| <b>Test objective:</b>               | Evaluation according to French VOC-regulation                                           |
| <b>Sample description by client:</b> | BARNIZ AL AGUA ECOLÓGICO DECORACIÓN SATINADO,<br>Código de producto: M21                |
| <b>Sampled by:</b>                   | INDUSTRIAS TITAN, S.A.U.                                                                |
| <b>Date of sampling:</b>             | Not applicable                                                                          |
| <b>Location of sampling:</b>         | at the client                                                                           |
| <b>Date of production:</b>           | Not applicable                                                                          |
| <b>Date of arrival of sample:</b>    | 31.07.2019                                                                              |
| <b>Test period:</b>                  | 31.07.2019 - 17.09.2019                                                                 |
| <b>Date of report:</b>               | 23.09.2019                                                                              |
| <b>Number of pages of report:</b>    | 14                                                                                      |
| <b>Testing laboratory:</b>           | eco-INSTITUT Germany GmbH, Cologne<br>except ‡ subcontracted<br># outside accreditation |
| <b>Test objective fulfilled:</b>     | ✓ 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](http://www.eco-institut.de/en/advertising)

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## Sample View

| Internal Sample-no. | Description by customer                                               | Condition upon delivery | Type of sample                      |
|---------------------|-----------------------------------------------------------------------|-------------------------|-------------------------------------|
| A004                | BARNIZ AL AGUA ECOLÓGICO DECORACIÓN SATINADO, Código de producto: M21 | without objection       | Barniz al agua ecologico decoration |



A004: BARNIZ AL AGUA ECOLÓGICO DECORACIÓN SATINADO, Código de producto: M21

## Evaluation<sup>#</sup>

The product **BARNIZ AL AGUA ECOLÓGICO DECORACIÓN SATINADO**, Código de producto: **M21** has been tested on behalf of **Tecnalia Research & Innovation**.

This evaluation bases on the test criteria of the decree no. 2011-321 of March 23<sup>rd</sup>, 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.

### VOC regulation

| Emission analysis         | Concentration (Test chamber air)<br>[µg/m³] | Class            |                  |                  |                  |
|---------------------------|---------------------------------------------|------------------|------------------|------------------|------------------|
| Substance                 | after 28 days                               | C                | B                | A                | A+               |
| Formaldehyde              | < 2                                         | > 120            | < 120            | < 60             | < 10             |
| Acetaldehyde              | < 2                                         | > 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-Dichlorobenzene       | < 1                                         | > 120            | < 120            | < 90             | < 60             |
| Ethylbenzene              | < 1                                         | > 1500           | < 1500           | < 1000           | < 750            |
| 2-Butoxyethanol           | < 1                                         | > 2000           | < 2000           | < 1500           | < 1000           |
| Styrene                   | < 1                                         | > 500            | < 500            | < 350            | < 250            |
| <b>TVOC<sub>tol</sub></b> | 10                                          | <b>&gt; 2000</b> | <b>&lt; 2000</b> | <b>&lt; 1500</b> | <b>&lt; 1000</b> |



## Summary evaluation<sup>#</sup>

The product **BARNIZ AL AGUA ECOLÓGICO DECORACIÓN SATINADO**, Código de producto: **M21** 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, 23.09.2019

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

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

## Evaluation<sup>#</sup>

Le produit **BARNIZ AL AGUA ECOLÓGICO DECORACIÓN SATINADO**, Código de producto: **M21** a été testé sous la responsabilité du **Tecnalia Research & Innovation**.

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.

### COV décret

| Analyse des émissions  | Concentration<br>(air de la chambre d'essai)<br>[µg/m³] | Classe |        |        |        |
|------------------------|---------------------------------------------------------|--------|--------|--------|--------|
| Substance              | au bout de 28 jours                                     | C      | B      | A      | A+     |
| Formaldéhyde           | < 2                                                     | > 120  | < 120  | < 60   | < 10   |
| Acétaldéhyde           | < 2                                                     | > 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  |
| COV <sub>tot</sub>     | 10                                                      | > 2000 | < 2000 | < 1500 | < 1000 |

## Résumé d'évaluation<sup>#</sup>

Le produit **BARNIZ AL AGUA ECOLÓGICO DECORACIÓN SATINADO**, Código de producto: **M21** 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, 23.09.2019

A handwritten signature in black ink, reading "M. A. Dobaj".

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

## 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

#### A004, Preparation of test sample

|                                            |                                                                                                                                               |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Date:                                      | 13.08.2019                                                                                                                                    |
| Pre-treatment:                             | Application on glass with a brush; application quantity 100 g/m <sup>2</sup> ; 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 [0.63g]                                                                                                                       |

#### A004, Test chamber conditions according to DIN ISO 16000-9

|                         |                                         |
|-------------------------|-----------------------------------------|
| Chamber volume:         | 0.125 m <sup>3</sup>                    |
| Temperature:            | 23°C ± 1°C                              |
| Relative humidity:      | 50 % ± 1 %                              |
| Air pressure:           | normal                                  |
| Air:                    | cleaned                                 |
| Air change rate:        | 0.5 h <sup>-1</sup>                     |
| Air velocity:           | 0.3 m/s                                 |
| Loading:                | 0.05 m <sup>3</sup> /m <sup>3</sup>     |
| Specific air flow rate: | 10 m <sup>3</sup> /(m <sup>2</sup> · h) |
| Air sampling:           | 28 days after test chamber loading      |

#### Analytics

|                            |                                                                                                                           |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Aldehydes and Ketones      | DIN ISO 16000-3                                                                                                           |
| Limit of determination:    | 2 µg/m <sup>3</sup>                                                                                                       |
| Volatile Organic Compounds | DIN ISO 16000-6                                                                                                           |
| Limit of determination:    | 1 µg/m <sup>3</sup> (1,4-Cyclohexanedimethanol, Diethylene glycol, 1,4-Butanediol, Linalyl acetate: 5 µg/m <sup>3</sup> ) |
| Note for analysis:         | not specified                                                                                                             |

## 1.1 Sample A004, 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:

Sample: A004: BARNIZ AL AGUA ECOLÓGICO DECORACIÓN SATINADO, Código de producto: M21

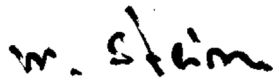
| No.       | Substance                                                  | CAS No.   | RT<br>[min] | Concentration+<br>(test chamber air)<br><small>Substances<br/>≥ 1 µg/m³<br/>28 days</small><br>[µg/m³] | Toluene-<br>equivalent<br><small>Substances<br/>≥ 5 µg/m³<br/>28 days</small><br>[µg/m³] |
|-----------|------------------------------------------------------------|-----------|-------------|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| <b>1</b>  | <b>Aromatic hydrocarbons</b>                               |           |             |                                                                                                        |                                                                                          |
| 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                                                                                      |
| <b>6</b>  | <b>Glycols, Glycol ethers, Glycol esters</b>               |           |             |                                                                                                        |                                                                                          |
| 6-3       | Ethylene glycol-monobutylether (2-Butoxyethanol)           | 111-76-2  |             | < 1                                                                                                    | < 5                                                                                      |
| <b>7</b>  | <b>Aldehyde</b>                                            |           |             |                                                                                                        |                                                                                          |
| 7-20      | Acetaldehyde                                               | 75-07-0   |             | < 2                                                                                                    | n.d.                                                                                     |
| 7-22      | Formaldehyde                                               | 50-00-0   |             | < 2                                                                                                    | n.d.                                                                                     |
| <b>13</b> | <b>Other identified substances in addition to LCI list</b> |           |             |                                                                                                        |                                                                                          |
|           | 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<br>after 28 days<br>[µg/m³] | SERa<br>[µg/(m² · h)] |
|----------------------------------------|-------------------------------------------|-----------------------|
| Sum of VOC according to ISO 16000-6    | 10                                        | 100                   |

Cologne, 23.09.2019



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

## Appendix

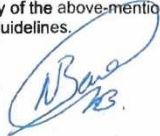
### I Sampling sheet

Produktprüfung Product testing  
Zertifizierung Certification  
Beratung Consulting

eco  
INSTITUT

#### Sampling Sheet\*

54508-004

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                        |                                                                                             |                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <b>Testing laboratory</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                     | eco-INSTITUT Germany GmbH<br>Schanzenstr. 6-20, D-51063 Cologne<br>Germany<br>Tel. +49 (0)221 - 931245-0<br>Fax +49 (0)221 - 931245-33 | <b>Sampler</b>                                                                              | Same as manufacturer.<br>(Name, Company, Phone number)                                                                          |
| <b>Name of manufacturer / distributor at place of sampling</b><br>(Address / Stamp)                                                                                                                                                                                                                                                                                                                                                                                           | INDUSTRIAS TITAN, S.A.U<br>Ind. Pratense, C/114 nº 21-23<br>08820 PRAT DE LLOBREGAT,<br>BARCELONA                                      | <b>Customer/ Invoice recipient</b><br>(if different from manufacturer)                      | TECNALIA<br>CIF: G48975767<br>Parque Científico y Tecnológico de Bizkaia C/Geldo, Edificio 700<br>E-48160 Derio (Bizkaia) Spain |
| <b>Product name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                           | BARNIZ AL AGUA ECOLÓGICO<br>DECORACIÓN SATINADO<br>Código de producto: M21                                                             | <b>Product type</b><br>(e.g. parquet, floor covering)                                       | To be used in timber structures, for example in old houses in timber beams facing interior spaces and windows and doors.        |
| <b>Model / programme / series</b>                                                                                                                                                                                                                                                                                                                                                                                                                                             | —                                                                                                                                      | <b>Batch</b>                                                                                | —                                                                                                                               |
| <b>Article number</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                         | —                                                                                                                                      | <b>Production date of batch</b>                                                             | —                                                                                                                               |
| <b>Samples are taken from</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <input type="checkbox"/> current production<br><input checked="" type="checkbox"/> storage                                             | <b>Sampling date</b>                                                                        |                                                                                                                                 |
| <b>Storage location before sampling</b>                                                                                                                                                                                                                                                                                                                                                                                                                                       | <input type="checkbox"/> in production<br><input checked="" type="checkbox"/> storage<br><input type="checkbox"/> other                | <b>Sampling time</b>                                                                        |                                                                                                                                 |
| <b>Storage location:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Manufacturer location                                                                                                                  | <b>Storage conditions before sampling</b>                                                   | <input type="checkbox"/> open<br><input checked="" type="checkbox"/> packaged                                                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                        | <b>Packaging material:</b>                                                                  | Plastic                                                                                                                         |
| <b>Special features</b> (possible negative effects through emissions at place of sampling (e.g. benzine, exhaust fumes), unclarities, questions etc.)                                                                                                                                                                                                                                                                                                                         |                                                                                                                                        | <b>Application rate:</b> 81,54gr/m2                                                         |                                                                                                                                 |
| <b>Validation</b><br>Hereby the signer affirms the accuracy of the above-mentioned statements. The sample was chosen, sampled and packaged according to the sampling guidelines.<br>Date: 01.08.19      Signature: <br>(Company stamp)  Inspiring Business<br>Fundación TECNALIA Research & Innovation |                                                                                                                                        |                                                                                             |                                                                                                                                 |
| * Please take one sampling sheet for each sample! The sampling instruction must be strictly maintained.                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                        |                                                                                             |                                                                                                                                 |
| <b>Order</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                        | Reference from Tecnalia: 083198                                                             |                                                                                                                                 |
| (Please insert quote number, or - if not available, please enter the desired analysis)                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                        | Test required: French labelling without VOC<br>(02188+02193)<br>official order: SPC19-07306 |                                                                                                                                 |

DAKKS  
Deutscher  
Akreditierungsstelle  
D-PL 14117-01-00

## II Definition of terms

|                                                                             |                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VOC<br>(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<br>(carcinogenic, mutagenic, reproduction-toxic VOC, VVOC and SVOC) | All individual substances with the following categories:<br>Regulation (EC) No. 1272/2008: Category Car.1A and 1B, Muta. 1A and 1B, Repr. 1A and 1B<br>TRGS 905: K1A, K1B, M1A, M1B, R1A, R1B<br>IARC: Group 1 and 2A<br>DFG (MAK lists): Category III1 and III2 |
| VVOC<br>(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                                             | 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.<br>(Chemical Abstracts Service) | International unique numerical identifier for a chemical substance                                                                                                                          |
| Toluene equivalent                      | Concentration, calculated as toluene equivalent                                                                                                                                             |

### III      **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 standard d8 toluene. As far as feasible, identification and quantification limit of any substance shall be 1 µg per m<sup>3</sup> for substances adsorbed on Tenax and 2 µg/m<sup>3</sup> 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.

## IV 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 <sup>2</sup> )   | relation between emission and surface       |
| v = unit volume (m <sup>3</sup> ) | 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 <sub>l</sub> | in µg/(m·h)               |
| surface-specific | SER <sub>a</sub> | in µg/(m <sup>2</sup> ·h) |
| volume-specific  | SER <sub>v</sub> | in µg/(m <sup>3</sup> ·h) |
| unit specific    | SER <sub>u</sub> | 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.