

INDUSTRIA ESPANOLA PARA EL  
DESARROLLO E INVESTIGACION  
2100, S.A.  
Antonio León  
C/ Panadero  
41520 EL VISO DEL ALCOR (Sevilla)

## Test Report No. B50028-001

This B-Test Report replaces the Test Report No. 50028-001 of 13.03.2015.

<b>Client:</b>	<b>INDUSTRIA ESPANOLA PARA EL DESARROLLO E INVESTIGACION 2100, S.A.</b>
<b>Sample description by client:</b>	<b>Graphenstone Exterior</b>
Sampling by:	Client
Date of arrival of sample:	15.01.2015
Date of report:	14.04.2015
Number of pages of report:	17
Testing parameter:	see table of contents
Testing laboratory:	eco-INSTITUT, Cologne except * subcontracted

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## Sample view

Internal Sample-no.	Description by customer	Condition upon delivery	Type of sample
A001	Graphenstone Exterior	without objection	paint

# Test Report

## 1 Emission test

### 1.1 Volatile Organic Compounds (VOC)

#### Definition of terms:

VOC (volatile organic compounds)	All individual materials with a concentration $\geq 0,001$ mg/m <sup>3</sup> in retention range C <sub>6</sub> (n-Hexane) to C <sub>16</sub> (n-Hexadecane) Substances refer to LCI lists / AgBB (DIBt)
TVOC (Total volatile organic compounds)	Sum of all individual substances in retention range C <sub>6</sub> to C <sub>16</sub> .
CMR-VOC (carcinogenic, mutagenic, reproduction-toxic VOC, VVOC and SVOC)	All individual substances with the following categories: Regulation (EC) No. 1272/2008: Category Car.1A and 1B, Muta. 1A and 1B, Repr. 1A and 1B TRGS 905: K1 and K2, M1 and M2, R1 and R2 IARC: Group 1 and 2A DFG (MAK lists): Category III1 and III2
VVOC (very volatile organic compounds)	All individual substances with concentration $\geq 0,001$ mg/m <sup>3</sup> in retention range $< C_6$
TVVOC (Total very volatile organic compounds)	Sum of all VVOC in retention range $< C_6$
SVOC (semi volatile organic compounds)	All individual materials $\geq 0,001$ mg/m <sup>3</sup> in retention range $> C_{16}$ (n-Hexadecane) to C <sub>22</sub> (Docosane)
TSVOC (Total semi volatile organic compounds)	Sum of all SVOC in retention range $> C_{16}$ to C <sub>22</sub> .
Identified and calibrated substances (C <sub>id sub</sub> ), substance specific calculated	Spectrum and retention time are concordant with the calibrated comparison substance
Not identified substances calculated as toluene equivalent (C <sub>ni tol</sub> )	Suggestion from the spectrum library with high probability and/or allocation to a group of substances
SER	Specific emission rate (see appendix)
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.

## List of analysed VOCs:

### Aromatic hydrocarbons

Toluene  
Ethylbenzene  
p-Xylene  
m-Xylene  
o-Xylene  
Isopropylbenzene  
n-Propylbenzene  
1,3,5-Trimethylbenzene  
1,2,4-Trimethylbenzene  
1,2,3-Trimethylbenzene  
2-Ethyltoluene  
1-Isopropyl-4-methylbenzene  
1,2,4,5-Tetramethylbenzene  
n-Butylbenzene  
1,3-Diisopropylbenzene  
1,4-Diisopropylbenzene  
Phenyl octane  
1-Phenyl decane<sup>2</sup>  
1-Phenyl undecane<sup>2</sup>  
4-Phenylcyclohexene  
Styrene  
Phenyl acetylene  
2-Phenyl propene  
Vinyl toluene  
Naphthalene  
Indene  
Benzene  
Cresol

### Saturated aliphatic substances

Hydrocarbons  
2-Methyl pentane<sup>1</sup>  
3-Methyl pentane<sup>1</sup>  
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

### Terpenes

δ-3-Carene  
α-Pinene  
β-Pinene  
Limonene  
Longifolene  
Caryophyllene  
Isolongifolene  
alpha-Phellandrene  
Myrcene  
Camphene  
alpha-Terpinene  
Longipinene  
beta-Caryophyllene  
beta-Farnesene  
alpha-Bisabolene

### Aliphatic alcohols and ether

1-Propanol<sup>1</sup>  
2-Propanol<sup>1</sup>  
tert-Butanol  
2-Methyl-1-propanol

1-Butanol  
1-Pentanol  
1-Hexanol  
Cyclohexanol  
2-Ethyl-1-hexanol  
1-Octanol  
4-Hydroxy-4-methyl-pentan-2-one  
1-Heptanol  
1-Nonanol  
1-Decanol

### Aromatic alcohols (phenols)

Phenol  
BHT (2,6-di-tert-butyl-4-methylphenol)  
Benzylalcohol

### Glycols, Glycol ether, Glycol ester

Propylenglycol (1,2-Dihydroxypropane)  
Ethylene glycol (Ethandiol)  
Ethylene glycol monobutyl ether  
Diethylene glycol  
Diethylene glycol-monobutyl ether  
2-Phenoxyethanol  
Ethylene carbonate  
1-Methoxy-2-propanol  
Glycolic acid butyl ester  
Texanol  
Butyldiglycol acetate  
Dipropylenglycol mono-methyl ether  
2-Methoxyethanol  
2-Ethoxyethanol  
2-Propoxyethanol  
2-Methylethoxyethanol  
2-Hexoxyethanol  
1,2-Dimethoxyethane  
1,2-Diethoxyethane  
2-Methoxyethyl acetate  
2-Ethoxyethyl acetate  
2-Butoxyethyl acetate  
2-(2-Hexoxyethoxy)-ethanol  
1-Methoxy-2-(2-methoxy-ethoxy)-ethane  
Propylene glycol di-acetate  
Dipropylene glycol  
Dipropylene glycol monomethylether acetate  
Dipropylene glycol mono-n-propylether  
1,4-Butanediol  
Tripropyleneglycolmonomethyl ether  
Triethylene glycol dimethyl ether  
1,2-Propylene glycol dimethyl ether  
TXIB  
Ethylidiglycol  
Dipropylene glycol-dimethyl ether  
Propylene carbonate  
Hexylene glycol  
3-Methyl-1-butanol  
1,2-Propylene glycol n-propyl ether  
1,2-Propylene glycol n-butyl ether  
Diethylglycol phenyl ether  
Neopentyl glycol

### Aldehydes

Butanal<sup>1,3</sup>  
Pentanal<sup>3</sup>  
Hexanal  
Heptanal  
2-Ethylhexanal  
Octanal  
Nonanal  
Decanal  
2-Butenal<sup>3</sup>

2-Pentenal<sup>3</sup>  
2-Hexenal  
2-Heptenal  
2-Octenal  
2-Nonenal  
2-Decenal  
2-Undecenal  
Furfural  
Glutaraldehyde  
Benzaldehyde  
Acetaldehyde<sup>1,3</sup>  
Propanal<sup>1,3</sup>  
Propenal<sup>1,3</sup>  
Isobutanol  
3-Methyl-2-propanol  
Methylisobutylketone  
Cyclopentanone  
Cyclohexanone

### Ketones

Ethylmethylketone<sup>3</sup>  
3-Methyl-2-propanol  
Methylisobutylketone  
Cyclopentanone  
Cyclohexanone  
Acetone<sup>1,3</sup>  
2-Methylcyclopentanone  
2-Methylcyclohexanone  
Acetophenone  
1-Hydroxyacetone

### Acids

Acetic acid  
Propionic acid  
Isobutyric acid  
Butyric acid  
Pivalic acid  
n-Valeric acid  
n-Hexanoic acid  
n-Heptanoic acid  
n-Octanoic acid  
2-Ethylhexanoic acid

### Esters and Lactones

Methylacetate<sup>1</sup>  
Ethyl acetate<sup>1</sup>  
Vinyl acetate<sup>1</sup>  
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 dimethyl ester  
Fumaric acid dibutyl ester  
Succinic acid dimethyl ester  
Hexandioldiacrylate  
Maleic acid dibutyl ester  
Butyrolactone  
Dibutyl glutarate  
Dibutyl succinate  
Dimethylphthalate  
Texanol  
Dipropylene glycol diacrylate

### Chlorinated hydrocarbons

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

### Others

1,4-Dioxane  
Caprolactam  
N-Methyl-2-pyrrolidone  
Octamethylcyclotetrasiloxane  
Methanamine  
2-Butanonoxime  
Triethyl phosphate  
5-Chlor-2-methyl-4-isothiazolin-3-one  
2-Methyl-4-isothiazolin-3-one (MIT)  
Triethylamine  
Decamethylcyclopentasiloxane  
Dodecamethylcyclopentasiloxane  
Tetrahydrofuran (THF)  
1-Decene  
1-Octene  
2-Pentylfuran  
Tetramethyl succinonitrile  
Propylencarbonate  
Isophorone  
Dimethylformamide (DMF)  
Tributyl phosphate

1 VVOC

2 SVOC

3 Analysis according to  
DIN ISO 16000-3

## Explanation of the 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.

$$\boxed{SER = q \cdot C}$$

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.

## Test method

Preparation of test sample:	Date:	13.02.2015
	Pre-treatment:	The paint was applied to a gypsum board, Application amount: 133,3 g/m <sup>2</sup>
	Masking of backside:	yes
	Masking of edges:	yes 100 %
	Relationship of unmasked edges to surface:	not applicable
	Charging:	related to area
	Dimensions:	30 cm x 20,8 cm
	Test chamber conditions::	Chamber volume:
Temperature:		23 °C
Relative humidity:		50 %
Air pressure:		normal
Air:		cleaned
Air change rate:		1 h <sup>-1</sup>
Air velocity:		0.3 m/s
Loading:		0.5 m <sup>2</sup> /m <sup>3</sup>
Specific air flow rate:		2 m <sup>3</sup> /m <sup>2</sup> · h
Air sampling:		11, 12 and 14 days after test chamber loading
Analytics:	DIN ISO 16000-3	
	DIN ISO 16000-6	
	Limit of determination:	1 µg/m <sup>3</sup>

## Measurement time 11 days after test chamber loading

### 1.1.1 TVOC<sub>Tol 11d</sub>

**Test parameter:**

Total volatile organic compounds (TVOC), test chamber, air sampling 11 days after test chamber loading

**Test result:**

Sample: | A001: Graphenstone Exterior

Total volatile organic compounds (Toluene equivalent DIN ISO 16000-6)	Concentration (test chamber air) [µg/m <sup>3</sup> ]	SER <sub>a</sub> [µg/m <sup>2</sup> h]
TVOC <sub>11d</sub>	10	20

### 1.1.2 Formaldehyde<sub>11d</sub> and Acetaldehyde<sub>11d</sub>

**Test parameter:**

Formaldehyde and Acetaldehyde, test chamber, air sampling 11 days after test chamber loading

**Test method:**

Preparation of test sample and  
Test chamber conditions: | see Volatile organic compounds

Analytics: | DIN ISO 16000-3

Limit of determination: | 2 µg/m<sup>3</sup> ≈ 0,002 ppm

**Test result:**

Sample: | A001: Graphenstone Exterior

Substance	Concentration (Test chamber air) [µg/m <sup>3</sup> ]	Concentration (Test chamber air) [ppm]
Formaldehyde	< 2	< 0,002
Acetaldehyde	< 2	-

## Measurement time 12 days after test chamber loading

### 1.1.3 TVOC<sub>Tol 12d</sub>

**Test parameter:**

Total volatile organic compounds (TVOC), test chamber, air sampling 12 days after test chamber loading

**Test result:**

Sample: | A001: Graphenstone Exterior

Total volatile organic compounds (Toluene equivalent DIN ISO 16000-6)	Concentration (test chamber air) [µg/m <sup>3</sup> ]	SER <sub>a</sub> [µg/m <sup>2</sup> h]
TVOC <sub>12d</sub>	10	20

### 1.1.4 Formaldehyde<sub>12d</sub> and Acetaldehyde<sub>12d</sub>

**Test parameter:**

Formaldehyde and Acetaldehyde, test chamber, air sampling 12 days after test chamber loading

**Test method:**

Preparation of test sample and  
Test chamber conditions: | see Volatile organic compounds

Analytics: | DIN ISO 16000-3

Limit of determination: | 2 µg/m<sup>3</sup> ≈ 0,002 ppm

**Test result:**

Sample: | A001: Graphenstone Exterior

Substance	Concentration (Test chamber air) [µg/m <sup>3</sup> ]	Concentration (Test chamber air) [ppm]
Formaldehyde	< 2	< 0,002
Acetaldehyde	< 2	-



## Measurement time 14 days after test chamber loading

### 1.1.5 CMR-VOC<sub>14d</sub>

**Test parameter:**

Carcinogenic, mutagenic and reproduction-toxic volatile organic compounds (CMR VOC), test chamber, air sampling 14 days after test chamber loading

**Test result:**

Sample: | A001: Graphenstone Exterior

No.	Substance	CAS No.	Concentration (Test chamber air) [µg/m <sup>3</sup> ]	CMR classifica- tion*)
<b>VOC<sub>14d</sub>: Identified and calibrated substances in accordance with LCI list/AgBB, substance specific calculated (C<sub>id sub</sub>)</b>				
-	-	-	n.d.	-
<b>VOC<sub>14d</sub>: Further identified and calibrated CMR substances in addition to LCI list/AgBB, substance specific calculated (C<sub>id sub</sub>)</b>				
-	-	-	n.d.	-
<b>VOC<sub>14d</sub>: Further identified, not calibrated CMR substances, calculated as toluene equivalent (C<sub>ni tol</sub>)</b>				
-	-	-	n.d.	-

\*) Classification acc. to Regulation (EC) No. 1272/2008: Category Carc. 1A and 1B, Muta. 1A and 1B, Repr. 1A and 1B, TRGS 905: K1 and K2, M1 and M2, R1 and R2, IARC: Group 1 and 2A, DFG (MAK list): Category III1 and III2

	Concentration (Test chamber air) [µg/m <sup>3</sup> ]	SER <sub>a</sub> [µg/m <sup>2</sup> h]
<b>Sum of VOC</b> with the following categorisations: Regulation (EC) No. 1272/2008: Category Carc. 1A and 1B, Muta. 1A and 1B, Repr. 1A and 1B TRGS 905: K1 and K2, M1 and M2, R1 and R2 IARC: Group 1 and 2A DFG (MAK list): Category III1 and III2	n.d.	n.d.

n.d. = not detectable

### 1.1.6 VOC / TVOC<sub>14d</sub>

**Test parameter:**

Volatile organic compounds (VOC), test chamber, air sampling 14 days after test chamber loading

**Test result:**

Sample: | A001: Graphenstone Exterior

No.	Substance	CAS No.	Concentration (Test chamber air) [µg/m <sup>3</sup> ]
<b>VOC<sub>14d</sub>: Identified and calibrated substances in accordance with LCI list/AgBB, substance specific calculated (c<sub>id sub</sub>)</b>			
<b>1</b>	<b>Aromatic hydrocarbons</b>		
1-1	Toluene	108-88-3	5
<b>VOC<sub>14d</sub>: Further identified and calibrated substances in addition with LCI list/AgBB, substance specific calculated (c<sub>id sub</sub>)</b>			
-	-	-	n.d.
<b>VOC<sub>14d</sub>: Not calibrated substances calculated as toluene equivalent (c<sub>ni tol</sub>)</b>			
-	-	-	n.d.

<b>Total volatile organic compounds</b>	<b>Concentration (test chamber air) [µg/m<sup>3</sup>]</b>	<b>SER<sub>a</sub> [µg/m<sup>2</sup>h]</b>
<b>TVOC<sub>14d</sub></b>	<b>5</b>	<b>10</b>
<b>Total volatile organic compounds (Toluene equivalent DIN ISO 16000-6)</b>	<b>Concentration (test chamber air) [µg/m<sup>3</sup>]</b>	<b>SER<sub>a</sub> [µg/m<sup>2</sup>h]</b>
<b>TVOC<sub>14d</sub></b>	<b>10</b>	<b>20</b>

Further VOC sums	Concentration (test chamber air) [µg/m <sup>3</sup> ]	SER <sub>a</sub> [µg/m <sup>2</sup> h]
<b>Sum VOC without LCI</b>	n.d.	n.d.
<b>Sum of bicyclic terpenes</b>	n.d.	n.d.
<b>Sum of sensitising materials</b> with the following categorisations: DFG (MAK lists): Category IV German Federal Institute for Risk Assessment lists: Cat A TRGS 907	n.d.	n.d.
<b>Sum of VOC</b> with the following categorisations: Regulation (EC) No. 1272/2008: Category Carc. 2, Muta. 2, Repr. 2 TRGS 905: K3, M3, R3 IARC: Group 2B DFG (MAK list): Category III3	5	10
<b>C<sub>9</sub> - C<sub>14</sub> - Alkanes / Isoalkanes</b>	n.d.	n.d.
<b>Sum C<sub>4</sub>-C<sub>11</sub> Aldehydes, acyclic, aliphatic</b>	n.d.	n.d.
<b>Sum C<sub>9</sub>-C<sub>15</sub> Alkyl benzenes</b>	n.d.	n.d.
<b>Sum Cresols</b>	n.d.	n.d.

<b>R-Value (without dimension)<sub>14d</sub></b>	<b>0</b>
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n.d. = not detectable

### 1.1.7 SVOC<sub>14d</sub>

**Test parameter:**

Semivolatile organic compounds (SVOC), test chamber, air sampling 14 days after test chamber loading

**Test result:**

Sample: | A001: Graphenstone Exterior

No.	Substance	CAS No.	Concentration (test chamber air) [µg/m <sup>3</sup> ]
<b>SVOC<sub>14d</sub>: Identified and calibrated substances in accordance with LCI list/AgBB, substance specific calculated(c<sub>id sub</sub>)</b>			
-	-	-	n.d.
<b>SVOC<sub>14d</sub>: Further identified and calibrated substances in addition to LCI list/AgBB, substance specific calculated(c<sub>id sub</sub>)</b>			
-	-	-	n.d.
<b>SVOC<sub>14d</sub>: Not calibrated substances calculated as toluene equivalent (c<sub>ni tol</sub>)</b>			
-	-	-	n.d.

Total semivolatile organic compounds	Concentration (test chamber air) [µg/m <sup>3</sup> ]	SER <sub>a</sub> [µg/m <sup>2</sup> h]
<b>TSVOC<sub>14d</sub></b>	n.d.	n.d.

n.d. = not detectable

### 1.1.8 VVOC<sub>14d</sub>

**Test Parameter:**

Very volatile organic compounds (VVOC), test chamber, air sampling 14 days after test chamber loading

**Test result:**

Sample: | A001: Graphenstone Exterior

No.	Substance	CAS-No.	Concentration (test chamber air) [µg/m <sup>3</sup> ]
<b>VVOC<sub>14d</sub>: Identified and calibrated substances in accordance with LCI list/AgBB, substance specific calculated (C<sub>id sub</sub>)</b>			
<b>2</b>	<b>Saturated aliphatic hydrocarbons</b>		
2-1	3-Methylpentane	96-14-0	2
<b>10</b>	<b>Esters und Lactones</b>		
10-1	Methylacetate	79-20-9	1
10-2	Ethylacetate	141-78-6	3
<b>VVOC<sub>14d</sub>: Further identified and calibrated substances in addition to LCI list/AgBB, substance specific calculated (C<sub>id sub</sub>)</b>			
-	-	-	n.d.
<b>VVOC<sub>14d</sub>: Not calibrated, identified substances calculated as toluene equivalent (C<sub>ni tol</sub>)</b>			
-	-	-	n.d.

Total very volatile organic compounds	Concentration (test chamber air) [µg/m <sup>3</sup> ]	SER <sub>a</sub> [µg/m <sup>2</sup> h]
<b>TVVOC<sub>14d</sub></b>	<b>6</b>	<b>12</b>

n.d. = not detectable

### 1.1.8.1 Formaldehyde<sub>14d</sub> and Acetaldehyde<sub>14d</sub>

**Test parameter:**

Formaldehyde and Acetaldehyde, test chamber, air sampling 14 days after test chamber loading

**Test method:**

Preparation of test sample and Test chamber conditions:	see Volatile organic compounds
Analytics:	DIN ISO 16000-3
Limit of determination:	2 µg/m <sup>3</sup> ≈ 0,002 ppm

**Test result:**

Sample:	A001: Graphenstone Exterior
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Substance	Concentration (Test chamber air) [µg/m <sup>3</sup> ]	Concentration (Test chamber air) [ppm]
Formaldehyde	< 2	< 0,002
Acetaldehyde	< 2	-

## 2 VOC Content \*

**Test parameter:** Volatile content

**Test methods:**

Method	Principle	Parameter	Detection limit	Uncertainty, Um (%)
LEED 2009 EQ c4.2 ASTM D 2369 - 10	Gravimetric	Total Volatiles, SCAQMD rule 304	1 g/l	10%
Karl Fischer	Titration	Water Content	-	20%

Volatile content of the sample was determined gravimetrically by heating up to 110 °C during 60 minutes.  
 The result is the average of double testing. The result was calculated as:  
 ( [g all volatiles] - [g water] - [g exempt compounds] ) / ( [l material] - [l water] - [l exempt compounds] )

Um (%): The expanded uncertainty Um is equal to 2 x RSD%

**Test result:**

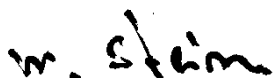
Sample: A001: Graphenstone Exterior

Sample	Solid content % mass	Water content % mass	Exempt compounds % mass	VOC less water less exempt compounds, g/l	VOC limit g/l
A001: Graphenstone Exterior	56.2	43.8	0***	< 1	550*

\* VOC limit for "Shellac: Pigmented"

\*\*\* no information about exempt compounds. Set to zero.

Cologne, 13.03.2015



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

## Expert evaluation (California Specification 01350)

The product **Graphenstone Exterior** has been tested on behalf of **INDUSTRIA ESPAÑOLA PARA EL DESARROLLO E INVESTIGACIÓN 2100, S.A.**

This evaluation bases on the test criteria of the „Emission testing method for California Specification 01350 (02/2010)“.

The VOC concentrations are calculated as Specific Emission Rate ( $SER_a$ ). For the “Estimated Airborne Concentration in a standard private office” the  $SER_a$  is divided by area-specific flow rate of 1.86 m<sup>3</sup>/m<sup>2</sup>h for floorings in a standard private office (acc. to chapter 4.3 “IAQ Concentration Modelling”).

The results documented in the test report were evaluated as follows (acc. to Target CREL VOCs, CS01350, Table 4-1):

No.	Compound Name	CAS-No.	$SER_a$ 14d [ $\mu\text{g}/\text{m}^2\text{h}$ ]	Estimated Airborne Concentration in standard private of- fice ( $SER_a$ 14d divided by 1.86 m/h) [ $\mu\text{g}/\text{m}^3$ ]	Allowable Concentration in standard private office [ $\mu\text{g}/\text{m}^3$ ]
1-1	Toluene	108-88-3	10	5,38	150
1-2	Ethylbenzene	100-41-4	n.d.	n.d.	1000
1-4	p- Xylene,	106-42-3	n.d.	n.d.	350
1-5	m- Xylene,	108-38-3			
1-6	o- Xylene	95-47-6			
1-25	Styrene	100-42-5	n.d.	n.d.	450
1-30	Naphthalene	91-20-3	n.d.	n.d.	4.5
2-2	n-Hexane	110-54-3	n.d.	n.d.	3500
4-3	Isopropanol	67-63-0	n.d.	n.d.	3500
5-1	Phenol	108-95-2	n.d.	n.d.	100
6-2	Ethylene glycol (Ethandiol)	107-21-1	n.d.	n.d.	200
6-8	1-Methoxy-2-propanol	107-98-2	n.d.	n.d.	3500
6-13	2-Methoxyethanol	109-86-4	n.d.	n.d.	30
6-14	2-Ethoxyethanol	110-80-5	n.d.	n.d.	35
6-20	2-Methoxyethyl acetate	110-49-6	n.d.	n.d.	45
6-21	2-Ethoxyethyl acetate	111-15-9	n.d.	n.d.	150
7-20	Acetaldehyde	75-07-0	n.d.	n.d.	70
7-22	Formaldehyde	50-00-0	n.d.	n.d.	9
10-3	Vinyl acetat	108-05-4	n.d.	n.d.	100
11-1	Tetrachlorethene	127-18-4	n.d.	n.d.	17.5
12-1	Dioxane (1.4-)	123-91-1	n.d.	n.d.	1500
-	Benzene	71-43-2	n.d.	n.d.	30
-	1,4-Dichlorbenzene	106-46-7	n.d.	n.d.	400
-	Dimethylformamide (DMF)	68-12-2	n.d.	n.d.	40
-	Isophorone	78-59-1	n.d.	n.d.	1000
-	Trichlorethene	79-01-6	n.d.	n.d.	300
-	Carbon tetrachloride	56-23-5	n.d.	n.d.	20
-	Chlorobenzene	108-90-7	n.d.	n.d.	500
-	Chloroform	67-66-3	n.d.	n.d.	150



No.	Compound Name	CAS-No.	SER <sub>a</sub> 14d [ $\mu\text{g}/\text{m}^2\text{h}$ ]	Estimated Airborne Concentration in standard private of- fice (SER <sub>a</sub> 14d divided by 1.86 m/h) [ $\mu\text{g}/\text{m}^3$ ]	Allowable Concentration in standard private office [ $\mu\text{g}/\text{m}^3$ ]
-	Dichloroethylene (1,1)	75-35-4	n.d.	n.d.	35
-	Epichlorohydrin	106-89-8	n.d.	n.d.	1.5
-	Methyl chloroform	71-55-6	n.d.	n.d.	500
-	Methylene chloride	75-09-2	n.d.	n.d.	200
-	Methyl t-butyl ether	1634-04-4	n.d.	n.d.	4000
-	Carbon disulfide	75-15-0	n.d.	n.d.	400

\*) Standard private office: Volume 30,6 m<sup>3</sup>, Floor surface 11,1 m<sup>2</sup>, Air change rate 0,68 h<sup>-1</sup>,  
Area specific emission flow rate 1,86 m<sup>3</sup>/m<sup>2</sup>h

n.d. = not detectable

## Summary evaluation

The product **Graphenstone Exterior** meets the emission requirements of the "Emission testing method for California Specification 01350 (02/2010)".

Cologne, 14.04.2015



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