

## **Test Report No. 50462-002 (II) B**

VOC Decree France

This test report replaces test report no. 50462-002 (II), dated 07.09.2015.

<b>Sample description by client:</b>	Stone Veneer
Sampling by:	Client
Date of arrival of sample:	21.07.2015
Date of report:	22.09.2015
Number of pages of report:	13
Testing parameter:	see table of contents
Testing laboratory:	eco-INSTITUT Germany GmbH, Cologne

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## Sample view

Internal Sample-no.	Description by customer	Condition upon delivery
A002	Stone Veneer, 300x250 mm	without objection

# Test Report

## 1 Emission test

### 1.1 Volatile Organic Compounds (VOC)

#### Definition of terms:

VOC (volatile organic compounds)	All individual materials with a concentration $\geq 0,001 \text{ mg/m}^3$ 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 III1and III2
VVOC (very volatile organic compounds)	All individual substances wit concentration $\geq 0,001 \text{ mg/m}^3$ in retention range < C <sub>6</sub>
TVVOC (Total very volatile organic compounds)	Sum of all VVOC in retention range < C <sub>6</sub>
SVOC (semi volatile organic compounds)	All individual materials $\geq 0,001 \text{ mg/m}^3$ in retention range > C <sub>16</sub> (n-Hexadecane) to C <sub>22</sub> (Docosane)
TSVOC (Total semi volatile organic compounds)	Sum of all SVOC in retention range > C <sub>16</sub> 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:**

<b>Aromatic hydrocarbons</b>	1-Butanol	2-Pentenal <sup>3</sup>	<b>Chlorinated hydrocarbons</b>
Toluene	1-Pentanol	2-Hexenal	Tetrachlorethene
Ethylbenzene	1-Hexanol	2-Heptenal	1,1,1-Trichlorethane
p-Xylene	Cyclohexanol	2-Octenal	Trichlorethene
m-Xylene	2-Ethyl-1-hexanol	2-Nonenal	1,4-Dichlorbenzene
o-Xylene	1-Octanol	2-Decenal	
Isopropylbenzene	4-Hydroxy-4-methyl-pentan-2-one	2-Undecenal	
n-Propylbenzene	1-Heptanol	Furfural	<b>Others</b>
1,3,5-Trimethylbenzene	1-Nonanol	Glutaraldehyde	1,4-Dioxane
1,2,4-Trimethylbenzene	1-Decanol	Benzaldehyde	Caprolactam
1,2,3-Trimethylbenzene		Acetaldehyde <sup>1,3</sup>	N-Methyl-2-pyrrolidone
2-Ethyltoluene		Propanal <sup>1,3</sup>	Octamethylcyclotetrasiloxane
1-Isopropyl-4-methylbenzene		Propenal <sup>1,3</sup>	Methenamine
1,2,4,5-Tetramethylbenzene		Isobutanol	2-Butanoxime
n-Butylbenzene	BHT (2,6-di-tert-butyl-4-methylphenol)	3-Methyl-2-propanol	Triethyl phosphate
1,3-Diisopropylbenzene	Benzylalcohol	Methylisobutylketone	5-Chlor-2-methyl-4-isothiazolin-3-one
1,4-Diisopropylbenzene		Cyclopentanone	2-Methyl-4-isothiazolin-3-one (MIT)
Phenyl octane		Cyclohexanone	Triethylamine
1-Phenyl decane <sup>2</sup>	Propylenglycol (1,2-Dihydroxypropane)	Ethylmethylketone <sup>3</sup>	Decamethylcyclopentasiloxane
1-Phenyl undecane <sup>2</sup>	Ethylene glycol (Ethandiol)	3-Methyl-2-propanol	Dodecamethylcyclopentasiloxane
4-Phenylcyclohexene	Ethylene glycol monobutyl ether	Methylisobutylketone	Tetrahydrofuran (THF)
Styrene	Diethylene glycol	Cyclopentanone	1-Decene
Phenyl acetylene	Diethylene glycol-monobutyl ether	Cyclohexanone	1-Octene
2-Phenyl propene	2-Phenoxyethanol	Acetone <sup>1,3</sup>	2-Pentylfuran
Vinyl toluene	Ethylene carbonate	2-Methylcyclopentanone	Tetramethyl succinonitrile
Naphthalene	1-Methoxy-2-propanol	2-Methylcyclohexanone	Propylencarbonate
Indene	Glycolic acid butyl ester	Acetophenone	Isophorone
Benzene	Texanol	1-Hydroxyacetone	Dimethylformamide (DMF)
Cresol	Butyldiglycol acetate		Tributyl phosphate
<b>Saturated aliphatic substances</b>	Dipropylenglycol mono-methyl ether		
Hydrocarbons	2-Methoxyethanol	<b>Acids</b>	
2-Methyl pentane <sup>1</sup>	2-Ethoxyethanol	Acetic acid	1 VVOC
3-Methyl pentane <sup>1</sup>	2-Propoxyethanol	Propionic acid	2 SVOC
n-Hexane	2-Methylethoxyethanol	Isobutyric acid	3 Analysis according to
Cyclohexane	2-Hexoxyethanol	Butyric acid	DIN ISO 16000-3
Methylcyclohexane	1,2-Dimethoxyethane	Pivalic acid	
n-Heptane	1,2-Diethoxyethane	n-Valeric acid	
n-Octane	2-Methoxyethyl acetate	n-Hexanoic acid	
n-Nonane	2-Ethoxyethyl acetate	n-Heptanoic acid	
n-Decane	2-Butoxyethyl acetate	n-Octanoic acid	
n-Undecane	2-(2-Hexoxyethoxy)-ethanol	2-Ethylhexanoic acid	
n-Dodecane	1-Methoxy-2-(2-methoxy-ethoxy)-ethane		
n-Tridecane	Propylene glycol di-acetate	<b>Esters and Lactones</b>	
n-Tetradecane	Dipropylene glycol	Methylacetate <sup>1</sup>	
n-Pentadecane	Dipropylene glycol	Ethyl acetate <sup>1</sup>	
n-Hexadecane	monomethylether acetate	Vinyl acetate <sup>1</sup>	
Methylcyclopentane	Dipropylene glycol mono-n-propylether	Isopropyl acetate	
1,4-Dimethylcyclohexane	1,4-Butanediol	Propyl acetate	
<b>Terpenes</b>	Tripropylene glycolomonomethyl ether	2-Methoxy-1-methylethyl acetate	
δ-3-Caren	Triethylene glycol dimethyl ether	n-Butyl formate	
α-Pinene	1,2-Propylene glycol dimethyl ether	Methylmethacrylate	
β-Pinene	TXIB	Isobutylacetate	
Limonene	Ethyldiglycol	1-Butyl acetate	
Longifolene	Dipropylene glycol-dimethyl ether	2-Ethylhexyl acetate	
Caryophyllene	Propylene carbonate	Methyl acrylate	
Isolongifolene	Hexylene glycol	Ethyl acrylate	
alpha-Phellandrene	3-Methyl-1-butanol	n-Butyl acrylate	
Myrcene	1,2-Propylene glycol n-propyl ether	2-Ethylhexyl acrylate	
Campheine	1,2-Propylene glycol n-butyl ether	Adipic acid dimethyl ester	
alpha-Terpinend	Diethylglycol phenyl ether	Fumaric acid dibutyl ester	
Longipinene	Neopentyl glycol	Succinic acid dimethyl ester	
beta-Caryophyllene		Hexanediol diacrylate	
beta-Farnesen		Maleic acid dibutyl ester	
alpha-Bisabolene		Butyrolactone	
<b>Aliphatic alcohols and ether</b>	Aldehydes	Dibutyl glutarate	
1-Propanol <sup>1</sup>	Butanal <sup>1,3</sup>	Dibutyl succinate	
2-Propanol <sup>1</sup>	Pentanal <sup>3</sup>	Dimethylphthalate	
tert-Butanol	Hexanal	Texanol	
2-Methyl-1-propanol	Heptanal	Dipropylene glycol diacrylate	
	2-Ethylhexanal		
	Octanal		
	Nonanal		
	Decanal		
	2-Butenal <sup>3</sup>		

## 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:

I = 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 <sub>I</sub> in $\mu\text{g}/\text{m h}$
surface-specific	SER <sub>a</sub> in $\mu\text{g}/\text{m}^2 \text{ h}$
volume-specific	SER <sub>v</sub> in $\mu\text{g}/\text{m}^3 \text{ h}$
unit specific	SER <sub>u</sub> in $\mu\text{g}/\text{u h}$

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.

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

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 ( $\mu\text{g}$ ), whereby 1 mg = 1000  $\mu\text{g}$ .

**Test method TS 16516 with following parameters:**

Preparation of test sample:	Date:	31.07.2015
	Pre-treatment:	not applicable
	Masking of backside:	yes
	Masking of edges:	yes 100 %
	Relationship of unmasked edges to surface:	not applicable
	Charging:	related to area
	Dimensions:	2 Platten: 25,3 cm x 19,8 cm _ 1 Platte: 15,7 cm x 15,7 cm
Test chamber conditions:	Chamber volume:	0.125 m <sup>3</sup>
	Temperature:	23 °C
	Relative humidity:	50 %
	Air pressure:	normal
	Air:	cleaned
	Air change rate:	0.5 h <sup>-1</sup>
	Air velocity:	0,3 m/s
	Loading:	1 m <sup>2</sup> /m <sup>3</sup>
	Specific air flow rate:	0,5 m <sup>3</sup> /m <sup>2</sup> · h
	Air sampling:	3 and 28 days after test chamber loading
Analytics:	DIN ISO 16000-3	
	Limit of determination:	2 µg/m <sup>3</sup>
	DIN ISO 16000-6	
	Limit of determination:	1 µg/m <sup>3</sup>

## Measurement time 28 days after test chamber loading

### 1.1.1 VOC / TVOC<sub>28d</sub>

#### Test parameter:

Volatile organic compounds (VOC), test chamber, air sampling 28 days after test chamber loading

#### Test result:

Sample:

A002: Stone Veneer,

No.	Substance	CAS No.	Concentration (Test chamber air) [µg/m <sup>3</sup> ]
<b>VOC<sub>28d</sub>: Identified and calibrated substances in accordance with LCI list/AgBB, substance specific calculated (c<sub>id sub</sub>)</b>			
1	<b>Aromatic hydrocarbons</b>		
1-1	Toluene	108-88-3	4
1-2	Ethylbenzene	100-41-4	n.d.
1-4	p-Xylene	106-42-3	n.d.
1-5	m-Xylene	108-38-3	
1-6	o-Xylene	95-47-6	n.d.
1-11	1,2,4-Trimethylbenzene	95-63-6	n.d.
1-25	Styrene	100-42-5	n.d.
6	<b>Glycols, Glycol ethers, Glycol esters</b>		
6-3	Ethylene glycol monobutyl ether	111-76-2	n.d.
11	<b>Chlorinated hydrocarbons</b>		
11-1	Tetrachlorethene	127-18-4	n.d.
<b>VOC<sub>28d</sub>: Further identified and calibrated substances in addition with LCI list/AgBB, substance specific calculated (c<sub>id sub</sub>)</b>			
1	<b>Aromatic hydrocarbons</b>		
	Benzene	71-43-2	n.d.
11	<b>Chlorinated hydrocarbons</b>		
	1,4-Dichlorbenzene	106-46-7	n.d.

n.d. = not detectable

Total volatile organic compounds (Toluene Equivalent DIN ISO 16000-6)	Concentration (test chamber air) [µg/m <sup>3</sup> ]
TVOC <sub>tol,28d</sub>	22

### 1.1.1.1 Formaldehyde<sub>28d</sub> and Acetaldehyde<sub>28d</sub>

**Test parameter:**

Formaldehyde and Acetaldehyde, test chamber, air sampling 28 days after test chamber loading

**Test method:**

Preparation of test sample:	according to DIN EN 717-1 see Volatile organic compounds
Test chamber conditions:	DIN EN 717-1 with the following deviations: <ul style="list-style-type: none"> <li>- No determination of the equilibrium concentration; the formaldehyde emission is indicated at a measuring point as determined above.</li> <li>- Chamber volume: see Volatile organic compounds</li> <li>- Relative humidity: 50%</li> <li>- Air change rate and loading: see Volatile organic compounds</li> </ul> Emission chamber parameters: see volatile organic compounds
Air sampling:	28 days after test chamber loading
Analytics:	DIN ISO 16000-3
	Limit of determination: 2 µg/m <sup>3</sup> ≈ 0,002 ppm

**Test result:**

Sample:	A002: Stone Veneer,
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Substance	Concentration (Test chamber air) [µg/m <sup>3</sup> ]	Concentration (Test chamber air) [ppm]
Formaldehyde	2	< 0,002
Acetaldehyde	3	-

## 2 Phthalates, chamber air analytics

**Test parameter:**

Phthalates, chamber air analytics

**Test method:**

Analytics: DIN ISO 16000-6

Limit of determination: 1 µg/m<sup>3</sup>

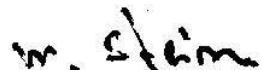
**Test result:**

Sample: A002: Stone Veneer,

Substance	Content (Test chamber air) [µg/m <sup>3</sup> ]
Dibutylphthalate (DBP)	n.d.
Diethylhexylphthalate (DEHP)	n.d.

n.d.: not detectable

Cologne, 22.09.2015



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

### 3 Expert evaluations

#### 3.1 Expert evaluation (French VOC / CMR regulation)

This evaluation bases on the test criteria of the decree no. 2011-321 of March 23<sup>rd</sup>, 2011 (VOC) and executive decisions of May 28<sup>th</sup>, 2009 and April 30<sup>th</sup>, 2009 (CMR) of the French Ministry of Ecology, Sustainable Development, Transport and Housing.

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

#### VOC- Decree France

**Sample:** A002: Stone Veneer,

Substance	Concentration (Test chamber air) [µg/m <sup>3</sup> ] after 28 days	Class			
		C	B	A	A+
Formaldehyde	2	>120	<120	<60	<10
Acetaldehyde	3	>400	<400	<300	<200
Toluene	4	>600	<600	<450	<300
Tetrachlorethene	< 1	>500	<500	<350	<250
o-/m-/p-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
Ethylenglycol-monobutylether	< 1	>2000	<2000	<1500	<1000
Styrene	< 1	>500	<500	<350	<250
<b>TVOC<sub>tol</sub></b>	<b>22</b>	<b>&gt;2000</b>	<b>&lt;2000</b>	<b>&lt;1500</b>	<b>&lt;1000</b>

#### CMR Regulation

Substance	Concentration (Test chamber air) [mg/m <sup>3</sup> ] after 28 days	Limit value [mg/m <sup>3</sup> ] after 28 days
Benzene	< 1	< 1
Trichlorethene	< 1	< 1
Dibutylphthalate (DBP)	< 1	< 1
Diethylhexylphthalate (DEHP)	< 1	< 1

### 3.1.1 Summary evaluation

The product **Stone Veneer**, meets the requirements of the **Class A+** of the decree no. 2011-321 of March 23, 2011 and executive decisions of May 28<sup>th</sup>, 2009 and April 30<sup>th</sup>, 2009 (CMR) of the French Ministry of Ecology, Sustainable Development, Transport and Housing.

Cologne, 22.09.2015



Tobias Rüsing, Dipl.-Geol.  
(project manager)

### 3.2 Evaluation d'expert

Cette évaluation est basée sur les critères du décret n° 2011-321 du 23 mars 2011 (COV décret) et arrêté du 28 mai 2009 et 30 avril 2009 (CMR arrêté) par le Ministère de l'environnement, 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 (air de la chambre d'essai) [ $\mu\text{g}/\text{m}^3$ ] au bout de 28 jours	Classe			
		C	B	A	A+
Formaldéhyde	2	>120	<120	<60	<10
Acétaldéhyde	3	>400	<400	<300	<200
Toluène	4	>600	<600	<450	<300
Tétrachloréthylène	< 1	>500	<500	<350	<250
Xylène	< 1	>400	<400	<300	<200
1,2,4-Triméthylbenzène	< 1	>2 000	<2 000	<1 500	<1 000
1,4-Dichlorobenzène	< 1	>120	<120	<90	<60
Ethylbenzène	< 1	>1 500	<1 500	<1 000	<750
2-Butoxyéthanol	< 1	>2 000	<2 000	<1 500	<1 000
Styrène	< 1	>500	<500	<350	<250
COVT <sub>tol</sub>	22	>2 000	<2 000	<1 500	<1 000

#### CMR arrêté

Analyse des émissions	Concentration (air de la chambre d'essai) [ $\mu\text{g}/\text{m}^3$ ] après 28 jours	Valeur limite [ $\mu\text{g}/\text{m}^3$ ] après 28 jours
Substances		
Benzène	< 1	< 1
Trichloréthylène	< 1	< 1
Phthalate de bis (2-éthylhexyle) (DEHP)	< 1	< 1
Phthalat de dibutyle	< 1	< 1

### 3.2.1 Résumé d'évaluation

Le produit **Stone Veneer**, correspond aux exigences de la **classification A+** sur les critères du décret n° 2011-321 du 23 mars 2011 (COV décret) et arrêté du 28 mai 2009 et 30 avril 2009 (CMR arrêté) par le Ministère de l'énergie, du développement durable, des transports et du logement.

Cologne, 22.09.2015



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