

Mehta Stone and Mining Industries
W-9/2, DLF City, Phase III,
Gurgaon, Haryana, India

Test Report No. 50462-002 (II) B

VOC Decree France

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

Client:	Mehta Stone and Mining Industries
Sample description by client:	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 ₆ (n-Hexane) to C ₁₆ (n-Hexadecane) Substances refer to LCI lists / AgBB (DIBt)
TVOC (Total volatile organic compounds)	Sum of all individual substances in retention range C ₆ to C ₁₆ .
CMR-VOC (carcinogenic, mutagenic, reproduction-toxic VOC, VVOC and SVOC)	All individual substances with the following categories: Regulation (EC) No. 1272/2008: Category Car.1A and 1B, Muta. 1A and 1B, Repr. 1A and 1B TRGS 905: 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 $\geq 0,001 \text{ mg/m}^3$ 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 $\geq 0,001 \text{ mg/m}^3$ in retention range $> C_{16}$ (n-Hexadecane) to C ₂₂ (Docosane)
TSVOC (Total semi volatile organic compounds)	Sum of all SVOC in retention range $> C_{16}$ to C ₂₂ .
Identified and calibrated substances (C _{id sub}), substance specific calculated	Spectrum and retention time are concordant with the calibrated comparison substance
Not identified substances calculated as toluene equivalent (C _{ni tol})	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 decane₂
 1-Phenyl undecane₂
 4-Phenylcyclohexene
 Styrene
 Phenyl acetylene
 2-Phenyl propene
 Vinyl toluene
 Naphthalene
 Indene
 Benzene
 Cresol

Saturated aliphatic substances

Hydrocarbons
 2-Methyl pentane₁
 3-Methyl pentane₁
 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

™₃-Xopев
 (-)-Πtveve
 ®-Πtveve
 Limonene
 Longifolene
 Caryophyllene
 Isolongifolene
 alpha-Phellandrene
 Myrcene
 Camphene
 alpha-Terpinend
 Longipinene
 beta-Caryophyllene
 beta-Farnesen
 alpha-Bisabolon

Aliphatic alcohols and ether

1-Propanol₁
 2-Propanol₁
 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
 Ethyldiglycol
 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

Butanal₃
 Pentanal₃
 Hexanal
 Heptanal
 2-Ethylhexanal
 Octanal
 Nonanal
 Decanal
 2-Butenal₃

2-Pentalal₃
 2-Hexenal
 2-Heptenal
 2-Octenal
 2-Nonenal
 2-Decenal
 2-Undecenal
 Furfural
 Glutaraldehyde
 Benzaldehyde
 Acetaldehyde_{1,3}
 Propanal₃
 Propenal₃
 Isobutenal
 3-Methyl-2-propanol
 Methylisobutylketone
 Cyclopentanone
 Cyclohexanone

Ketones

Ethylmethylketone₃
 3-Methyl-2-propanol
 Methylisobutylketone
 Cyclopentanone
 Cyclohexanone
 Acetone_{1,3}
 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

Methylacetate₁
 Ethyl acetate₁
 Vinyl acetate₁
 Isopropyl acetate
 Propyl acetate
 2-Methoxy-1-methylethyl acetate
 n-Butyl formate
 Methylmethacrylate
 Isobutylacetate
 1-Butyl acetate
 2-Ethylhexyl acetate
 Methyl acrylate
 Ethyl acrylate
 n-Butyl acrylate
 2-Ethylhexyl acrylate
 Adipic acid 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
 Methenamine
 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 (m²)relation between emission and surface

v = unit volume (m³)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-specificSER _l in	µg/m h
surface-specificSER _a in	µg/m ² h
volume-specificSER _v in	µg/m ³ h
unit specificSER _u in	µg/u h

SER thus represents a product specific rate, which describes the mass of the volatile organic compound, which is emitted by the product per time unit at a certain time after beginning of the examination.

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

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 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 ³
	Temperature:	23 °C
	Relative humidity:	50 %
	Air pressure:	normal
	Air:	cleaned
	Air change rate:	0.5 h ⁻¹
	Air velocity:	0,3 m/s
	Loading:	1 m ² /m ³
	Specific air flow rate:	0,5 m ³ /m ² · h
	Air sampling:	3 and 28 days after test chamber loading
Analytics:	DIN ISO 16000-3 Limit of determination:	2 µg/m ³
	DIN ISO 16000-6 Limit of determination:	1 µg/m ³

Measurement time 28 days after test chamber loading

1.1.1 VOC / TVOC_{28d}

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 ³]
VOC_{28d}: Identified and calibrated substances in accordance with LCI list/AgBB, substance specific calculated (C_{id sub})			
1	Aromatic hydrocarbons		
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	Glycols, Glycol ethers, Glycol esters		
6-3	Ethylene glycol monobutyl ether	111-76-2	n.d.
11	Chlorinated hydrocarbons		
11-1	Tetrachlorethene	127-18-4	n.d.
VOC_{28d}: Further identified and calibrated substances in addition with LCI list/AgBB, substance specific calculated (C_{id sub})			
1	Aromatic hydrocarbons		
	Benzene	71-43-2	n.d.
11	Chlorinated hydrocarbons		
	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 ³]
TVOC _{tol,28d}	22

1.1.1.1 Formaldehyde_{28d} and Acetaldehyde_{28d}

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:

-No determination of the equilibrium concentration; the formaldehyde emission is indicated at a measuring point as determined above.

-Chamber volume: see Volatile organic compounds

-Relative humidity: 50%

-Air change rate and loading: see Volatile organic compounds

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/m³ ≈ 0,002 ppm

Test result:

Sample:

A002: Stone Veneer,

Substance	Concentration (Test chamber air) [µg/m ³]	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/m³

Test result:

Sample: A002: Stone Veneer

Substance	Content (Test chamber air) [µg/m ³]
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)

The product **Stone Veneer**, has been tested on behalf of **Mehta Stone and Mining Industries**

This evaluation bases on the test criteria of the decree no. 2011-321 of March 23rd, 2011 (VOC) and executive decisions of May 28th, 2009 and April 30th, 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 ³] 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
TVOC_{tol}	22	>2000	<2000	<1500	<1000

CMR Regulation

Substance	Concentration (Test chamber air) [mg/m ³] after 28 days	Limit value [mg/m ³] 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 28th, 2009 and April 30th, 2009 (CMR) of the French Ministry of Ecology, Sustainable Development, Transport and Housing.

Cologne, 22.09.2015

A handwritten signature in black ink, appearing to read "Tobias Rüsing".

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

3.2 Evaluation d'expert

Le produit **Stone Veneer**, a été testé sous la responsabilité du producteur **Mehtha Stone and Mining Industries**.

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'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 (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
COV_{tot}	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-éthylhexle) (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'écologie, du développement durable, des transports et du logement.

Cologne, 22.09.2015



Tobias Rüsing, Dipl.-Geol.
(Chef de projet)