Sihl AG
Bolligenstrasse 93
3006 Bern
Schweiz

Test Report No. 52487-001 II

Test objective:	**Evaluation according to French VOC- regulation**
Sample description by client:	**2517 Non-Wove design2wall FR**
Sampled by:	Christan Brun Sihl AG
Date of sampling:	16.08.2017
Location of sampling:	at the client
Date of production:	22.05.2017
Date of arrival of sample:	28.08.2017
Test period:	28.08.2017 - 12.10.2017
Date of report:	16.10.2017
Number of pages of report:	14
Testing laboratory:	eco-INSTITUT Germany GmbH, Cologne
Test objective fulfilled:	✓ Class A

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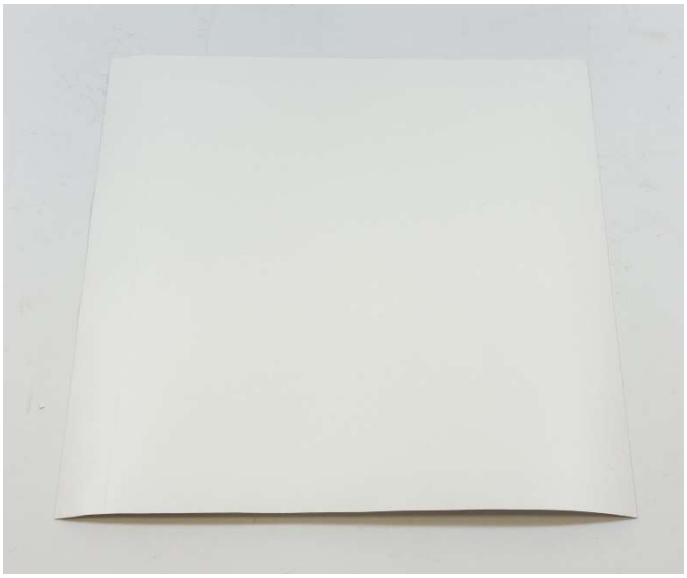
Sample View

Internal Sample-no.	Description by customer	Condition upon delivery	Type of sample
A001	2517 Non-Wove design2wall FR	without objection	coated wallpaper; Substrate: Nonwoven (Cellulose + Synthetic Fiber)



A001: 2517 Non-Wove design2wall FR

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Expert Evaluation

The product **2517 Non-Wove design2wall FR** has been tested on behalf of **Sihl AG**.

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

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

Emission analysis	**Concentration (Test chamber air) [µg/m³]**	**Class**			
Substance	**after 28 days**	**C**	**B**	**A**	**A+**
Formaldehyde	13	> 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-Dichlorbenzene	< 1	> 120	< 120	< 90	< 60
Ethylbenzene	< 1	> 1500	< 1500	< 1000	< 750
2-Butoxyethanol	< 1	> 2000	< 2000	< 1500	< 1000
Styrene	< 1	> 500	< 500	< 350	< 250
$TVOC_{tol}$	450	**> 2000**	**< 2000**	**< 1500**	**< 1000**

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Summary evaluation

The product **2517 Non-Wove design2wall FR** 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, 16.10.2017

Arne Herzog
(Project Manager)

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Evaluation d'expert

Le produit **2517 Non-Wove design2wall FR** a été testé sous la responsabilité du **Sihl AG**.
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 (air de la chambre d'essai) [µg/m³]**	**Classe**			
Substance	**au bout de 28 jours**	**C**	**B**	**A**	**A+**
Formaldéhyde	13	> 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
$COVT_{tol}$	450	**> 2000**	**< 2000**	**< 1500**	**< 1000**

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Résumé d‘évaluation

Le produit **2517 Non-Wove design2wall FR** 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, 16.10.2017

Arne Herzog
(Chef de projet)

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Laboratory report

1 Emission analysis

Test method

prEN 16516	Testing and evaluation of the release of dangerous substances; determination of emissions into indoor air

A001, Preparation of test sample

Date:	01.09.2017
Pre-treatment:	not applicable
Masking of backside:	yes
Masking of edges:	no
Relationship of unmasked edges to surface:	not applicable
Loading:	related to area
Dimensions:	35,3 cm x 35,3 cm

A001, Test chamber conditions according to DIN ISO 16000-9

Chamber volume:	0.125 m³
Temperature:	23°C ± 1°C
Relative humidity:	50 % ± 1 %
Air pressure:	normal
Air:	cleaned
Air change rate:	0.5 h^{-1}
Air velocity:	0.3 m/s
Loading:	1 m²/m³
Specific air flow rate:	0.5 m³/(m² · h)
Air sampling:	3 days after test chamber loading 28 days after test chamber loading

Analytics

Aldehydes and Ketones	DIN ISO 16000-3
Limit of determination:	2 µg/m³
Volatile Organic Compounds	DIN ISO 16000-6
Limit of determination:	1 µg/m³ (BIT: 5 µg/m³)
Note for analysis:	not specified

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1.1 Volatile Organic Compounds after days

Test objective:
Volatile Organic Compounds (VOC), test chamber, air sampling days after test chamber loading

Test result:
Sample:

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

+ identified and calibrated substances, substance specific calculated

n.d.: not determinable

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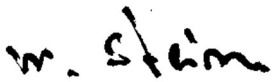
TVOC, Total volatile organic compounds	**Concentration after 28 days [µg/m³]**	**SER_a [µg/m²h]**
Sum of VOC according to ISO 16000-6	**450**	**230**

Cologne, 16.10.2017



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

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Appendix

I Sampling sheet

Produktprüfung Product testing
Zertifizierung Certification
Beratung Consulting

eco INSTITUT

Probenahmebegleitblatt*

Projektnummer eco-INSTITUT / wird vom Labor ausgefüllt: **52487-001**

Prüflabor	eco-INSTITUT Germany GmbH Schanzenstr. 6-20, D-51063 Köln Tel. +49 (0)221 - 931245-0 Fax +49 (0)221 - 931245-33	**Probenehmer** (Name, Firma, Telefon)	Christian Brun Sihl AG 0041 31 340 89 20
Name des Herstellers / Händlers am Probenahmeort (Adresse / Stempel)	Sihl AG Bolligenstrasse 93 CH-3006 Bern	**Auftraggeber/ Rechnungsempfänger** (falls abweichend vom Herstellernamen)	
Produktname	2517 Non-Wove design2wall FR	**Probeart** (z.B. Holzwerkstoff, Bodenbelag)	beschichte Tapete Substrat: Vliessstoff (Zellstoff+Synthesefaser)
Modell / Programm/ Serie		**Chargen-Nr.**	pv340-1
Artikel-Nr.	2517	**Produktionsdatum der Charge**	22.05.17
Probe wird gezogen ...	☐ aus der laufenden Produktion ☒ aus Lagerbeständen	**Datum der Probenahme**	16.08.17
		Uhrzeit	14:00
Wo wurde das Produkt vor Probenahme gelagert?	☐ Fertigung ☒ Lager ☐ Sonstiges Lagerort: Verarbeitung	**Wie wurde das Produkt vor Probenahme gelagert?**	☐ offen ☒ verpackt Verpackungsmaterial: PE-Hülle, Kartonbox ~3m2
Besonderheiten (mögliche negative Einflüsse durch Emissionen am Probenahmeort (z.B. Benzin-Abgase, Lösemittelemissionen aus der Fertigung), Unklarheiten, Fragen, etc.)	---		

Bestätigung
Hiermit bestätigt der Unterzeichner die Richtigkeit der oben gemachten Angaben. Die Probe wurde eigenhändig gemäß Probenahmeanleitung ausgewählt, gezogen und verpackt.

Datum: 24.08.17 Unterschrift:(Stempel) Sihl AG Bolligenstr. 93 CH-3006 Bern

* Bitte pro Probe ein Probenahmebegleitblatt ausfüllen! Die Probenahmeanleitung ist unbedingt einzuhalten!

Beauftragung (Bitte Angebotsnummer eintragen bzw. falls nicht vorhanden, Untersuchungsziel angeben)	Emissionsprüfung VOC

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Tel. +49 221.931245-0 / Fax +49 221.931245-33 / eco-institut.de / Geschäftsführer: Dr. Frank Kuebart, Daniel Tigges
HRB 17917 / USt-ID: DE 122653308 / Raiffeisenbank Frechen-Hürth, IBAN: DE60370623651701900010, BIC: GENODED1FHH

Nach DIN EN ISO/IEC 17025 akkreditiertes Prüflabor
DAkkS Deutsche Akkreditierungsstelle D-PL-20051-01-00

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II Definition of terms

VOC (volatile organic compounds)	All individual compounds with a concentration ≥ 1 µg/m³ in the retention range C_6 (n-Hexane) to C_{16} (n-Hexadecane)
TVOC	Total volatile organic compounds
TVOC according to prEN 16516	Sum of all VOC ≥ 5 µg/m³ 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 ≥ 5 µg/m³, SVOC ≥ 5 µg/m³ with LCI and not calibrated VOC ≥ 5 µg/m³ calculated as toluene equivalent
TVOC according to eco-INSTITUT-Label	Sum of all identified and calibrated VOC ≥ 1 µg/m³, SVOC ≥ 5 µg/m³ with LCI and not calibrated VOC ≥ 1 µg/m³ 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 ≥ 5 µg/m³ in the retention range C_6 to C_{16}
TVOC without LCI according to eco-INSTITUT-Label	Sum of all VOC without NIK ≥ 1 µg/m³ in the retention range C_6 to C_{16}
CMR-VOC (carcinogenic, mutagenic, reproduction-toxic VOC, VVOC and SVOC)	All individual substances with the following categories: Regulation (EC) No. 1272/2008: Category Car.1A and 1B, Muta. 1A and 1B, Repr. 1A and 1B TRGS 905: 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 with a concentration ≥ 1 µg/m³ 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 ≥ 5 µg/m³ with LCI
TVVOC according to eco-INSTITUT-Label	Sum of all identified and calibrated VVOC ≥ 1 µg/m³ with LCI
SVOC (semi volatile organic compounds)	All individual substances ≥ 1 µg/m³ in the retention range C_{16} to C_{22}
TSVOC	Total semi volatile organic compounds
TSVOC according to prEN 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 ≥ 5 µg/m³ without LCI
TSVOC without LCI according to eco-INSTITUT-Label	Sum of all SVOC ≥ 1 µg/m³ without LCI
TSVOC with LCI according to AgBB/DIBt	Sum of all identified and calibrated SVOC ≥ 5 µg/m³ with LCI
SER	Specific emission rate (see appendix IV)

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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 ≥ 1 µg/m³ with LCI, established by the AgBB in 2015
R value according to AgBB 2015/DIBt	R value for all identified and calibrated VOC ≥ 5 µg/m³ with LCI, established by the AgBB in 2015
R value according to Belgian regulation	R value for all identified and calibrated VOC ≥ 5 µg/m³ with LCI, established by the Belgian regulation
R value according to AFSSET	R value for all identified and calibrated VOC ≥ 5 µg/m³ with LCI, established by ANSES (French National Agency on Food Safety, Environment, and Workplace Security)
RT (retention time)	Time for a particular analyte to pass through the system (from the column inlet to the detector)
CAS No. (Chemical Abstracts Service)	International unique numerical identifier for a chemical substance
Toluene equivalent	Concentration, calculated as toluene equivalent

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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 toluene signal.

The concentrations of substances that have been determined are corrected based on the recovery rate for an internal standard (d8 toluene). Identification and quantification of the substances is limited to 1 µg per m^3 for substances adsorbed on Tenax and 2 µg/m^3 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 prEN 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.

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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 (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-specific	SER_l	in µg/(m·h)
surface-specific	SER_a	in µg/(m²·h)
volume-specific	SER_v	in µg/(m³·h)
unit specific	SER_u	in µg/(u·h)

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

$$SER = q \cdot c$$

q specific air flow rate (quotient from change of air rate and loading)

c concentration of the measured substance(s)

The result can be indicated in milligrams (mg) in place of micro grams (µg), whereby 1 mg = 1000 µg.

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