

REPORT
Emission Test Chamber Study
according to AFSSET

Product: Clipso imprimé UV (F11002793)

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1 Introduction

Laboratoires WESSLING S.A.R.L was contracted by CLIPSO PRODUCTION to perform an emission test chamber study of the product IMPRIME UV (F11002793) according to AFSSET-Standard.

The emission chamber test according to the specifications of the AFSSET (Agence Française de Sécurité Sanitaire de l'Environnement et du Travail) is a French method for assessing indoor air relevance of construction products. The emission behaviour is tested with regard to VOC (volatile organic compounds), carcinogens (C1 and C2), mutagens (M1 and M2), sensitizing substances and aldehydes

2 Test data

Product Data:	
Product: CLIPSO IMPRIME UV	Production No.: F11002793
Production Date: 31/03/2010	Date of Reception: 30.11.2010
Packaging: aluminium	Test Period: 07.12.2010 – 04.01.2011
Test Chamber Specifications:	
Volume: 110 l – Test Chamber (Stainless Steel)	
Temperature: 23 °C	Humidity: 50 % rel. humidity
Exchange Rate: 0,5 h ⁻¹	Volume Flow 917 ml/min
Load factor: 0,11 m ² /m ³	Area-specific Air Exchange Rate: 0,5 m ³ /(m ² h)
Date and duration of air sampling:	
16.12.2010	Tenax: 50 min (0,1 l/min) Multisorbent: 50 min (0,1 l/min) DNPH: 200 min (0,5 l/min)

10.01.2011	Tenax: 50 min (0,1 l/min) Multisorbent: 50 min (0,1 l/min) DNPH: 200 min (0,5 l/min)
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3 Test Method

The product was tested according to DIN EN ISO 16000-9 in a 110-liter test chamber made of stainless steel. The chamber was loaded on 13.12.2010. The test was designed for 28 days; the samples were taken on day 3 and on day 28.

According to the AFFSET scheme for wall textiles, the chamber was loaded with 1 m²/m³. According to the set air exchange 0,5 specific m³/ (m²h) – wich correspond to an area of 0,10 m² materials tested.

The chamber was operated with a room air temperature of 23°C and 50% relative humidity. The supplied air was filtered by activated carbon.

The fist sampling was done 3 days after loading the chamber by means of Tenax TA, Multisorbent and DNPH tubes performed. The resulting samples as well as the blank value were analyzed on VOC, aldehydes and carcinogens

At the end of the emission test on day 28 samples were taken by by means of Tenax TA, Multisorbent and DNPH tubes to check the final values.

4 Results

4.1 VOC

In accordance with DIN EN ISO 16000-6, for the determination of volatile organic compounds in indoor air about 5 litres of the chamber air are passed through a stainless steel adsorption tube filled with Tenax TA by means of a sampling device. In the laboratory, the tubes are thermally desorbed and the released substances identified by GC / MS analysis.

Table 4.1.1: VOC-results (3 d-measurement)

Parameter (CAS Registry Number)	Group	CAS Registry Number	VOC-Concentration Test Chamber (µg/m ³)	Guidance Value (µg/m ³)
Hexane	VOC	110-54-3	4,1	
Undecane	VOC	1120-21-4	2,8	
Tridecane	VOC	629-50-5	1,9	
Tetradecane	VOC	629-59-4	2,7	
Pentadecane	VOC	629-62-9	1,1	
Sum of aliphatics hydrocarbons			12,6	
Furfural	VOC	98-01-1	2,2	
Benzaldehyde	VOC	100-52-7	1,6	
Sum Aldehydes			3,8	
Butanol	VOC	71-36-3	12,2	
Ethyl hexanol	VOC	104-76-7	42,7	
Phenol	VOC	108-95-2	7,7	
BHT	VOC	128-37-0	12,8	
Propylene Glycol	VOC	57-55-3	6,5	
Ethylèneglycolmonobutylether	VOC	111-76-2	3,1	
2-Phenoxyethanol	VOC	122-99-6	105	
2-(2-Butoxyethoxy)ethylacetate	VOC	111-46-6	2,2	
Dipropylèneglycolmonomethylether	VOC	34590-94-8	1,3	
2-Butoxyethylacetate	VOC	112-07-2	1.830	
1-(2-Methoxymethylethoxy)-Propanolacetate	VOC	88917-22-0	1.100	
Cyclohexanone	VOC	108-94-1	14,6	
Acetic Acid	VOC	64-19-7	21,9	
Ethylhexylacetate	VOC	103-09-3	4,1	
Other Acrylates	VOC		17	
Dimethyladipate	VOC	627-93-0	3,3	

Dimethylsuccinate	VOC	106-65-0	1,6	
Dimethylglutarate	VOC	1119-40-0	5,9	
Sum of oxygenated hydrocarbons			3.191,9	
Caprolactame	VOC	105-60-2	318	
Methyl pyrrolidone	VOC	872-50-4	72,1	
Octamethylcyclotetrasiloxane	VOC	556-67-2	2,2	
Unidentified compounds	VOC		55	
Phenyl butanone	VOC	1007-32-5	16	
Trimethyl-Benzaldehyde	VOC	5779-72-6	20	
Benzophenone	SVOC	119-61-9	23	
Sum of other compounds			546,3	
VVOC (<C6)	VVOC		-	
TVOC (C6-C16)	VOC		3.730	10.000
SVOC (>C16-C22)	SVOC		23	

Table 4.1.2: VOC-results (28 d-measurement)

Parameter (CAS Registry Number)	Group	CAS Registry Number	VOC-Concentration Test Chamber (µg/m³)	Guidance Value (µg/m³)
2-Ethyl-1-hexanol	VOC	104-76-7	4,6	
BHT	VOC	128-37-0	16,7	
2-Phenoxyethanol	VOC	122-99-6	29,5	
2-Butoxyethylacetate	VOC	112-07-2	11,4	
1-(2-Methoxymethylethoxy)- Propanolacetate	VOC	88917-22-0	10	
Sum of oxygenated hydrocarbons			72,2	
Caprolactam	VOC	105-60-2	79,7	
Benzophenone	SVOC	119-61-9	33	
Sum of other compounds			116,9	
VVOC (<C6)	VVOC		---	---
TVOC (C6-C16)	VOC		156	1.000
SVOC (>C16-C22)	SVOC		33	---
R-Value			0,8	<1

CLI-value

4.2 Aldehydes

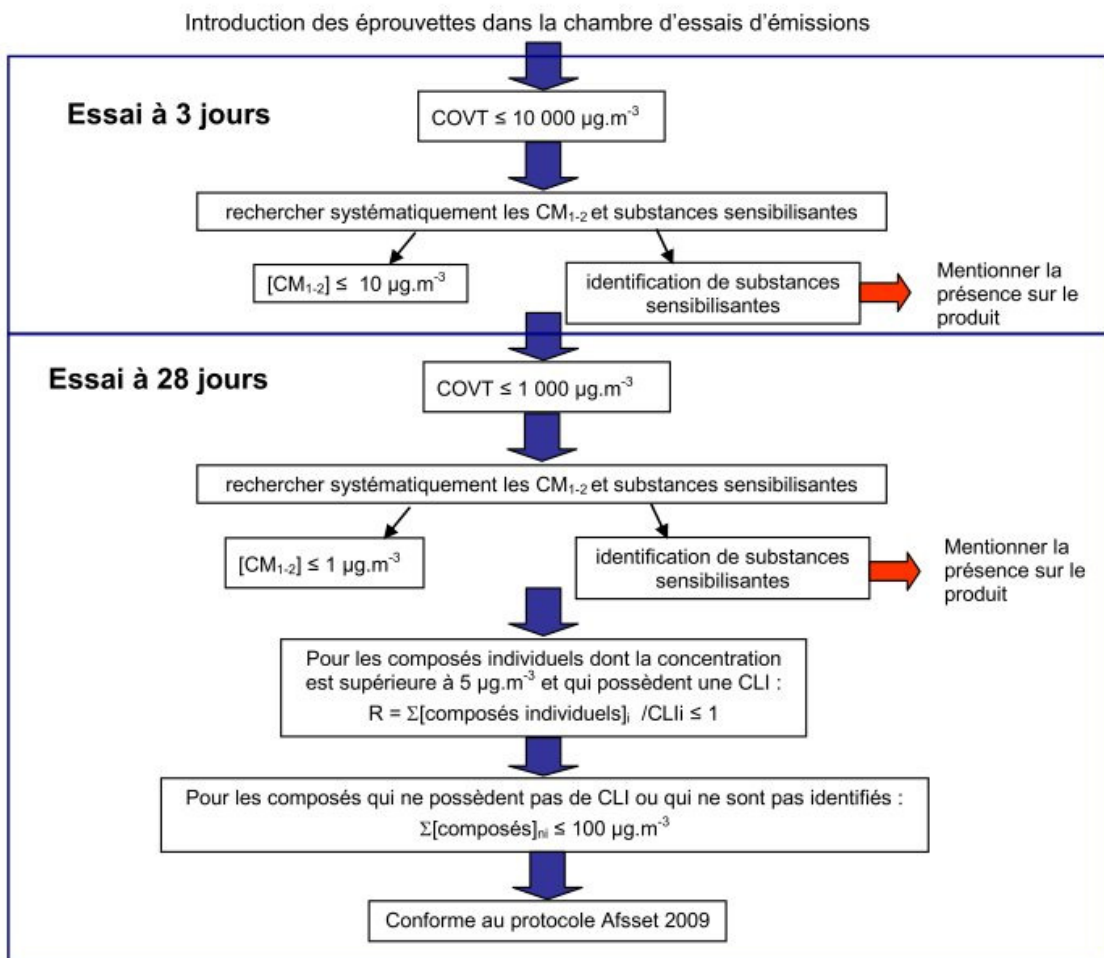
For the detection of aldehydes in indoor air 50 litres of air are directed through a derivatizing absorption medium (2,4-dinitrophenylhydrazine). The aldehydes in the air form corresponding hydrazones. After elution with acetone quality and quantity are determined by HPLC.

Table 4.2.1: Aldehydes-results (28 d-measurement)

Parameter	Concentration Test Chamber ($\mu\text{g}/\text{m}^3$)	R _i (composé _i / CLI _i)
Formaldehyde	<2	
Acetaldehyde	10,3	0,1
Propionaldehyde	<2	
Hexanal	<2	
Benzaldehyde	<2	
Decanal	<2	
Furaldehyde	<2	
Heptanal	<2	
Methacrolein	<2	
Nonanal	<2	
Octanal	<2	
Toluolaldehyde	<2	
2-Ethylhexanal	<2	
4-Methyl-2-Pentanon	<2	
2-Butanon u. Butrylaldehyde	<2	
Acetophenon u. Valeraldehyde	<2	

5 Evaluation

The AFSSET 2009 protocol sets the following criteria for the emission test:



5.1 TVOC₃ and TVOC₂₈

For the TVOC concentration a limit value of $\leq 10,000 \mu\text{g}/\text{m}^3$ after 3 days and $\leq 1,000 \mu\text{g}/\text{m}^3$ after 28 days is defined in the AFSSET protocol (see AFSSET 3.2.3.1).

The TVOC emissions after 3 days are $3,730 \mu\text{g}/\text{m}^3$ below the defined limit value of $10,000 \mu\text{g}/\text{m}^3$.

The TVOC emissions after 28 days are $156 \mu\text{g}/\text{m}^3$ below the defined limit value of $1,000 \mu\text{g}/\text{m}^3$.

After 3 and 28 days the SVOC's emission are respectively 23 and $33 \mu\text{g}/\text{m}^3$.

5.2 Carcinogens (C1 and C2) and mutagenic substances (M1 and M2)

For carcinogens and mutagenic substances (Cat. C1/C2 and M1/M2 according to EU classification and TRGS 905) a limit value of $10 \mu\text{g}/\text{m}^3$ after 3 days and $1 \mu\text{g}/\text{m}^3$ after 28 days is defined in the AFSSET protocol (see AFSSET 3.1.3.1).

No carcinogens and mutagenic substances were analysed in the samples taken on day 3 and day 28. The product IMPRIME UV meets the criterion.

5.3 Sensitizing Substances

If after 3 and 28 days of the substances:

- Glutaraldehyde (CAS No. 111-30-8)
- Hexamethylenetetramine (CAS 100-97-0)

are detected in the chamber, this shall be mentioned in the report (see AFSSET 3.1.3.2).

No sensitizing substances were detected after 3 and 28 days. This criterion is fulfilled by the product IMPRIME UV.

5.4 R-value (day 28)

An R-value of ≤ 1 after 28 days is given in the AFSSET protocol (see AFSSET 3.2.3.3). The R-value (CLI-value) is calculated based on the sum of all R_i values. This criterion is fulfilled by the product IMPRIME UV (*R-value: 0*).

5.5 VOC without CLI

After 28 days, the total concentration of VOCs without CLI has to be $\leq 100 \mu\text{g}/\text{m}^3$ (see AFSSET 3.2.3.4).

The total concentration of VOCs without CLI after 28 days is lower than the required limit of $100 \mu\text{g}/\text{m}^3$. This criterion is fulfilled by the product IMPRIME UV.

6 Summary

Laboratoire WESSLING S.A.R.L. was contracted by CLIPSO PRODUCTION to perform an emission test chamber study of the product IMPRIME UV according to AFSSET-Standard.

The TVOC limit values were not exceeded in the emission chamber testing of the product IMPRIME UV after 3 and 28 day.

The R-value (CLI-value) and the total concentration of VOCs without CLI after 28 days were under the limit values. Therefore the criterions given in the AFSSET protocol were fulfilled.

No CMR substances were analyzed in the 3-day and 28-day measurements done according to AFSSET 3.1.3.2.

The product IMPRIME UV fulfilled the test criteria given in the AFSSET protocol in the emission chamber test.

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