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Dresden, 2017-11-07
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Test Report
Order no. 251472/1/B

Client:	Karl Pedross AG / S.p.A. Zona industrial 1c 39021 Laces Italy
Date of order:	2012-04-12
Order:	Determination and evaluation of the VOC and formaldehyde emission of profile strips according to ISO 16000 parts 3, 6 and 9 and RAL-UZ 38 **Profile strip spruce veneer lacquered**
Contractor:	EPH – Laboratory Chemical Testing
Engineer in charge:	Dipl.-Ing. M. Broege

i.V. Dr. BZ

Prof. Dr. habil. M. Beyer
Head of Laboratory Chemical Testing

1. Assignment

Accomplishment of an emission test based on ISO 16000 parts 3, 6 and 9 and evaluation according to RAL-UZ 38.

2. Sample identification

Product name: **Profile strip spruce veneer lacquered**

3. Product description

Type:	profile strip
Length:	1.25 m
Profile:	KS80

4. Sampling

Date of production:	2012-04-19
Sampling:	by client
Date of sampling:	not reported
Packaging material:	foil
Number:	2 strips
Sample receipt at EPH:	2012-04-24

For testing 3 strips (8 cm x 38 cm) were used.

5. Emission measurement

Chamber test – ISO 16000 part 9

The test pieces (0.09 m^2) was placed into a test chamber – lying on the bottom, with sealed end faces – under the following conditions:

Temperature:	23 °C ± 1 K
Air humidity:	50 % ± 5 %
Air exchange rate:	0.5 / h ± 0.1 /h
Loading:	0.4 m^2/m^3
Chamber volume:	0.225 m^3
Storage:	2012-05-11

During the test the climatic parameters temperature and relative air humidity were recorded.

6. Analytics

Volatile organic compounds (VOC) – ISO 16000 part 6

The determination of the VOC was carried out by gaschromatography after previous adsorption on tenax and following thermodesorption with cryo focussion (GC-MS).

Sample air volume: 1 – 6 l

1.	Measurement	after 3 d	double determination
2.	Measurement	after 7 d	double determination

Aldehydes – ISO 16000 part 3

The determination of formaldehyde and other aldehydes was carried out by DNPH-method.

Sample air volume: 120 l

1. Measurement after 3 d double determination
2. Measurement after 7 d double determination

7. Results

VOC-Emission

Table 1: Test chamber concentration

Compound	CAS number	Concentration in µg/m³	
		3 d	7 d
Compounds with a boiling point 50 – 250 °C			
Acetic acid	000064-19-7	144	116
Hexanal	000066-25-1	3	3
Acetic acid, butyl ester	000123-86-4	83	73
.alpha.-Pinene	000080-56-8	8	11
Benzaldehyde	000100-52-7	8	9
Hexanoic acid	000142-62-1	1	1
Propylene Carbonate	000108-32-7	1	1
Heptane, 2,2,4,6,6-pentamethyl-	013475-82-6	7	8
Ethanol, 1-methoxy-, benzoate	051835-44-0	3	2
Acetaldehyde	000075-07-0	22	20
n. i. compound		< 1	< 1
Total		**280**	**244**
Compounds with a boiling point > 250°C			
Total		**< 1**	**< 1**
CMT substances			
Total		**< 1**	**< 1**

n. i. compound not identified compound
CMT substances carcinogenic, mutagenic and teratogenic (reproductive) substances Category 1 and 2

Table 2: Test chamber concentration at day 7, measured values as well as based on a model room with a loading of 0.007 m^2/m^3 and emission rate

Compound	**CAS number**	**Concentration in µg/m³ at a loading of 0.4 m²/m³**	**Emission rate in µg/m²h**	**Concentration in µg/m³ at a loading of 0.007 m²/m³**
Compounds with a boiling point 50 – 250 °C				
Acetic acid	000064-19-7	116	145	2
Hexanal	000066-25-1	3	4	< 1
Acetic acid, butyl ester	000123-86-4	73	91	1
.alpha.-Pinene	000080-56-8	11	14	< 1
Benzaldehyde	000100-52-7	9	11	< 1
Hexanoic acid	000142-62-1	1	1	< 1
Propylene Carbonate	000108-32-7	1	1	< 1
Heptane, 2,2,4,6,6-pentamethyl-	013475-82-6	8	10	< 1
Ethanol, 1-methoxy-, benzoate	051835-44-0	2	3	< 1
Acetaldehyde	000075-07-0	20	25	< 1
n. i. compounds		< 1	< 1	< 1
Total (TVOC)		**244**	**280**	**4**
Compounds with a boiling point > 250°C				
Total (TSVOC)		**< 1**	**< 1**	**< 1**
CMT substances				
Total		**< 1**	**< 1**	**< 1**

Formaldehyde

1. Measurement < 0.005 ppm after 3 days
2. Measurement < 0.005 ppm after 7 days

Based on a model room with a load of 0.007 m^2/m^3 the formaldehyde concentration on day 7 is < 0.005 ppm.

8. Evaluation

Volatile organic compounds (VOC) and formaldehyde

Table 3: Requirements according to RAL-UZ 38 table b

Compound	Start value (24 ± 2 h)	Final value (Day 28)
Formaldehyde	-	0.05 ppm
Organic compounds Boiling point 50 – 250 °C	-	600 µg/m³
Organic compounds Boiling point > 250 °C	-	100 µg/m³
CMR substances	< 1 µg/m³	< 1 µg/m³

R-value for loading 0.4 m²/m³ after day 7: 0.4

The tested product "profile strip spruce veneer lacquered" fulfills the requirements of the RAL-UZ 38 for furniture and other three-dimensional products regarding VOC and formaldehyde emission.

Dipl.-Ing. M. Broege
Engineer in charge