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Zona industriale 1c

39021 Laces

Italy

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Dresden, 2017-11-07
50 - br/ku

# Test Report
# Order no. 251472/1/B

| | |
|---|---|
| **Client:** | Karl Pedross AG / S.p.A.<br>Zona industrial 1c<br>39021 Laces<br>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<br>**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 **c**arcinogenic, **m**utagenic and **t**eratogenic (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