

Novofibre Panel Board Holding China Ltd.  
A2 Zone, Room A116  
Zhao Wei Hua Deng Mansion  
14 Jiuxianqiao Road, Chaoyang District

100015 Beijing

China

Dresden, 2013-12-19  
50-br/ku

## Test report Order number 2513483/F


**Customer:** Novofibre Panel Board Holding China Ltd.  
A2 Zone, Room A116  
Zhao Wei Hua Deng Mansion  
14 Jiuxianqiao Raod, Chaoyang District  
100015 Beijing

**Date of order:** 2013-10-18

**Order:** Determination and validation of the VOC and formaldehyde emission from a straw board according to "Arrêté étiquetage", ISO 16000 part 3, 6 and 9, VDI 4301 part 6  
**Straw board 22 mm**

**Contractor:** EPH – Laboratory chemical testing

**Engineer in charge:** Dipl.-Ing. M. Broege

  
Dipl.-Chem. K. Aehlig  
Head of laboratory  
Chemical testing

The test report contains 4 pages. Any duplication in part requires written approval from EPH.  
These test results are exclusively related to the tested material.

## 1. Assignment

Accomplishment of an emission test based on DIN ISO 16000 part 3, 6 and 9 and validation according to the French regulation **ARRÊTÉ** relatif à l'étiquetage des produits de construction ou de revêtement de mur ou de sol et des peintures et vernis sur leurs émissions de polluants volatils and CMR-Regulation.

## 2. Sample

Product name: **straw board**  
Thickness: 22 mm  
Sample receipt at EPH 2013-10-07

## 3. Emission measurement

### Chamber test – ISO 16000 part 9

The test pieces (2 pieces 500 x 500) were placed into a test chamber – lying on a rack – under the following conditions:

|                   |                                  |
|-------------------|----------------------------------|
| Temperature       | 23 °C ± 1K                       |
| Air humidity      | 50 % ± 5 %                       |
| Air exchange rate | 0.5 /h ± 0.1 /h                  |
| Loading           | 1 m <sup>2</sup> /m <sup>3</sup> |
| Chamber volume    | 1 m <sup>3</sup>                 |

Storage 2013-11-15

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

The applied test conditions correspond to the application wall.

## 4. Analytics

### Volatile organic compounds (VOC) - ISO 16000 part 6

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

Sample air volume: 1 – 6 l

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

### Formaldehyde/Aldehydes – ISO 16000 part 3

The determination of formaldehyde and other aldehydes was carried out applying DNPH-method. Sample air volume: 120 l

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

### Plasticizer (Phthalates) – VDI 4301 part 6

The determination of the plasticizers Bis(2-ethylhexyl)phthalat (DEHP) and Dibutylphthalat (DBP) is carried out by adsorption on tenax and following determination by GC-MS.

Sample air volume: 70 – 75 l

1. Measurement after 7 d double determination

## 5. Results

### VOC-Emission

Table 1: Test chamber concentrations

| Compound  | CAS-number  | Concentration in $\mu\text{g}/\text{m}^3$ |               |
|---|-------------|---|---------------|
|   |             | 3 d                                       | 7 d           |
| <i>Compounds with a boiling point 50 – 250 °C</i>   |             |   |               |
| Acetic acid   | 000064-19-7 | 238                                       | 170           |
| Cyclotrisiloxane, hexamethyl-                       | 000541-05-9 | 2   | < 1           |
| Benzaldehyde  | 000100-52-7 | 5   | 1             |
| Unidentified compounds                              |             | < 1                                       | < 1           |
| <b>Sum (TVOC)</b>                                   |             | <b>245</b>                                | <b>171</b>    |
| <i>Compounds with a boiling point of &gt; 250°C</i> |             |   |               |
|   |             |   |               |
| <b>Sum (TSVOC)</b>                                  |             | <b>&lt; 1</b>                             | <b>&lt; 1</b> |
| <i>Carcinogenic substances</i>                      |             |   |               |
|   |             |   |               |
| <b>Sum</b>  |             | <b>&lt; 1</b>                             | <b>&lt; 1</b> |
| <i>Plasticizer</i>                                  |             |   |               |
| Bis(2-ethylhexyl) phthalate (DEHP)                  | 000117-81-7 | -   | n.d.          |
| Dibutyl phthalate (DBP)                             | 000084-74-2 | -   | n.d.          |

n.d.

not detected

Carcinogenic substances

carcinogenic in categories 1 or 2 according to Table 3.2 or categories 1A and 1B according to Table 3.1 of Annex VI to Regulation (EC) No 1272/2008

TVOC

total volatile organic compounds between  $\text{C}_6 - \text{C}_{16}$ 

TSVOC

total semi-volatile organic compounds

### Formaldehyde

|                |           |       |        |
|----------------|-----------|-------|--------|
| 1. Measurement | 0.007 ppm | after | 3 days |
| 2. Measurement | 0.006 ppm | after | 7 days |

## 6. Evaluation

Table 2: Requirements regarding French regulation "Arrête étiquetage" in  $\mu\text{g}/\text{m}^3$ 

|                        | C                | B                | A                | A+               |
|------------------------|------------------|------------------|------------------|------------------|
| Formaldehyde           | > 120            | < 120            | < 60             | < 10             |
| Acetaldehyde           | > 400            | < 400            | < 300            | < 200            |
| Toluene                | > 600            | < 600            | < 450            | < 300            |
| Tetrachlorethylene     | > 500            | < 500            | < 350            | < 250            |
| Xylene                 | > 400            | < 400            | < 300            | < 200            |
| 1,2,4-Trimethylbenzene | > 2000           | < 2000           | < 1500           | < 1000           |
| 1,4-Dichlorobenzene    | > 120            | < 120            | < 90             | < 60             |
| Ethylbenzene           | > 1500           | < 1500           | < 1000           | < 750            |
| 2-Butoxyethanol        | > 2000           | < 2000           | < 1500           | < 1000           |
| Styrene                | > 500            | < 500            | < 350            | < 250            |
| <b>TVOC</b>            | <b>&gt; 2000</b> | <b>&lt; 2000</b> | <b>&lt; 1500</b> | <b>&lt; 1000</b> |

Requirements according CMR Regulation after 28 days:

|                 |                       |
|-----------------|-----------------------|
| Trichlorethylen | < 1 µg/m <sup>3</sup> |
| Benzol          | < 1 µg/m <sup>3</sup> |
| DEHP            | < 1 µg/m <sup>3</sup> |
| DBP             | < 1 µg/m <sup>3</sup> |

Table 3: Summarized test results after 7 days

|                        | µg/m <sup>3</sup> |
|------------------------|-------------------|
| Formaldehyde           | 7                 |
| Acetaldehyde           | 24                |
| Toluene                | n.d.              |
| Tetrachlorethylene     | n.d.              |
| Xylene                 | n.d.              |
| 1,2,4-Trimethylbenzene | n.d.              |
| 1,4-Dichlorbenzene     | n.d.              |
| Ethylbenzene           | n.d.              |
| 2-Butoxyethanol        | n.d.              |
| Styrene                | n.d.              |
| <b>TVOC</b>            | <b>171</b>        |
| <b>Classification</b>  | <b>A+</b>         |

n.d. not detected

The tested product "straw board 22 mm" equates, for the application wall, Category A+ according to the French regulation "Arrêté étiquetage". The requirements according CMR regulation on plasticizer are fulfilled.



Dipl.-Ing. M. Broege  
Engineer in charge