| | | | Fraunhofer |
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| Your reference | Your message dated | Our reference Hus | Braunschweig, 19 June 2019 |
| | <u>Test repo</u> | ort No. QA-2019-271 | <u>3</u> |
| Customer: | AGROP N Ptenský E 79843 Pt | IOVA a.s. Dvorek 99 ení (Czech Republic) | |
| Order dated: | 9 May 20 |)19 | |
| Receipt of sample: | 14 May 2 | 2019 | |
| WKI-ID-No.: | 0288_20 | 19 | |
| Start of test: | 29 May 2 | 2019 | |
| Objective of the test: | Determin | ation of the formaldehy | de release according to EN 717-1 |
| Content of the test rep | ort: | | |
| | 1. Task 2. Test m 3 .Execut 4. Test re | aterial ion of the test | |

This test report comprises 3 pages, 2 tables and 1 figure.

This test report is not permitted to be published incompletely. A publication in extracts is in any case subject to the previous consent of Fraunhofer Institute for Wood Research, Wilhelm-Klauditz-Institut WKI, Bienroder Weg 54E in 38108 Braunschweig (Germany).

The test results exclusively refer to the objects of the test. The test material was used up.



Fraunhoter-Gesellschaft zur Förderung der angewandten Forschung e. V., München Executive Board

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<u>1. Task</u>

The Fraunhofer Institute for Wood Research, Wilhelm-Klauditz-Institut WKI, was entrusted by Messrs. AGROP NOVA a.s. in 79843 Ptení (Czech Republic) with the determination of formaldehyde emission of a wood-based panel according to chamber method EN 717-1:2005 "Wood-based panels - Determination of formaldehyde release - Part 1: Formaldehyde emission by the chamber method".

The determination of formaldehyde release should be carried out according to the test methods required by the German Prohibition of Chemicals Ordinance "Chemikalien-Verbotsverordnung (ChemVerbotsV)". The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) announced the new analytical procedures for the sampling and investigation in the German "Bundesanzeiger" (German Federal Gazette) with date of 26 November 2018. The required test methods are mentioned in table 1 of this test report.

2. Test material

The test material was chosen, marked with

| "Sample name: | SWP 19(6-7-6) Spruce | | |
|------------------------|--------------------------|-----------------|----------------|
| Wood-based panel type: | 3 layered board, unfaced | Thickness (mm): | 19 |
| Production date: | 30 April 2019 | Product code: | A101905005044" |

and sent for testing to the WKI by the customer. The test material arrived at WKI packed in polyethylene foil on 14 May 2019, was marked with WKI-ID-No. "0288_2019" and stored under room conditions until the test start on 29 May 2019.

3. Execution of the test

For the determination of formaldehyde release two samples each with the dimensions of 500 mm x 500 mm x thickness and a total surface of 1 m² were put into a 1 m³ chamber. Based on the chamber volume and emission surface area the corresponding loading rate was 1 m²/m³. Prior to testing the edges were sealed gastight with aluminium foil to get a ratio U (unsealed edges) / A (surface area) of 1.5 m/m².

During the test the temperature was kept at 23°C \pm 0.5 K, the relative humidity of the air was kept at 45 \pm 3 % and the air exchange rate was adjusted to 1 h⁻¹. Therefore, the relationship between air exchange level and room load was 1.

The concentration of formaldehyde in the chamber was measured twice a day by drawing app. 0.12 m³ air from the chamber through gas washing bottles filled with absorption solution. The formaldehyde content of the aqueous solution was determined photometrically or fluorimetrically by the acetyl acetone method. Sampling has been periodically continued until the formaldehyde concentration in the chamber has reached a steady-state.

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4. Test result

For the tested sample named "SWP 19(6-7-6) Spruce - 19 mm" of Messrs. AGROP NOVA a.s. in 79843 Ptení (Czech Republic) tested according to EN 717-1 following formaldehyde release was determined in the test chamber:

| test period | formaldehyde release in the chamber | | |
|-------------|-------------------------------------|-------|--|
| [h] | [mg/m³] | [ppm] | |
| 315 | 0.010 | 0.01 | |

The course of formaldehyde release is shown in figure 1 enclosed to the test report. The blank value of the chamber before starting the test was determined with \leq 0.006 mg/m³ resp. 0.005 ppm (1 ppm \triangleq 1.24 mg HCHO/m³ air at 23°C and 1013 hPa).

5. Assessment of test result

According to the German Chemicals Prohibition Regulation (ChemverbotsV), Appendix 1 to Section 3, Prohibition on entry into force, "Entry 1: Formaldehyde" Clause 2 (1), coated and uncoated wood-based materials (particleboards, blockboard, veneer boards and fibreboards) shall not be placed on the market if the level of formaldehyde in the air determined as steady-state concentration in chamber caused by the wood-based material exceeds 0.1 ml/cbm (ppm).

Test tested material complies to the German ChemVerbotV as follows:

| Requirement of limit value fulfilledPtenský Dvorek 99 | Test method [test result] | Evaluation acc. limit value | ChemVerbotsV [BGA Blatt 34, 10/91] valid up to 2019-12-31 | ChemVerbotsV [BMU Veröffentlichung Prüfverfahren 2018-11-26] valid from 2020-01-01 | |
|--|------------------------------|--------------------------------|---|---|--|
| Chamber method | EN 717-1 | 0,1 ppm | X yes no | | |
| Chamber method | EN 717-1 [x factor 2] | 0,1 ppm | | X yes no | |

We draw your attention to the fact that the effected test was made as a material parameter and not as a classifying test.

K. Huslage

Kathrin Huslage Official in charge



7. Schwab

Dipl.-Ing. Harald Schwab Head of Testing, Supervision and Certifying Body

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Test conditions:



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Figure 1: Course of formaldehyde release [mg/m³] in the test chamber during the test of a sample named "SWP 19(6-7-6) Spruce - 19 mm" sent by Messrs. AGROP NOVA a.s. in 79843 Ptení (Czech Republic)

| chamber volume | | | 1 | [m³] |
|-----------------------|-----------------------------------|-----------------------|-------------------|--------------------|
| temperature | | | 23°C ± 0.5 | [°C] |
| rel. humidity | | | 45 % ± 3 | [%] |
| air exchange | (volume of air flow) | | 1 | [h ⁻¹] |
| emission surface area | (without edges) | | 1 | [m²] |
| loading rate | (surface area per chamber volume) | | 1 | [m² / m³] |
| air exchange rate | (air volume per chamber volume) | | 1 | [m³ / h / m³] |
| test pieces | number | dimensions | | |
| | 1 | length x width/height | 500 x 500 | [mm] |
| | 1 | length x width/height | 500 x 500 | [mm] |
| | | thickness | 19 19 | [mm] |
| | | edges | partly sealed gas | stight* |

* ref. to EN 717-1: ratio U (unsealed edges) / A (surface area) of 1.5 m/m²

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Table 1: Additional sample description given by the customer

Sample marked like: 3. SWP 19(6-7-6)mm (Spruce) (2 samples 500x500mm, total surface of 1m2)

Production data:

Date of production: April 30th, 2019 Ambient temperature: 23°C Relative humidity: 42% Glue: PVAc D4 RAKOLL ECO 4 Glue amount: 160 g/m2 Press: Italpresse2 Press. temperature: 125°C Pressing time: 420 s Press. pressure: 12 kg/cm2 Enclosure to test report No. QA-2019-2713 dated 19 June 2019



Table 2:Analytical procedures for sampling and testing announced by the German Federal Ministry for
the Environment, Nature Conservation and Nuclear Safety (BMU) with regard to formaldehyde
for fulfillment of the German ChemVerbotsV, published on 26 November 2018

Here: »Bekanntmachung analytischer Verfahren für Probenahmen und Untersuchungen für die in Anlage 1 der ChemVerbotsV genannten Stoffe und Stoffgruppen«

| Annex 1 (to § 3) ChemVerbotsV | Matrix | Sample preparation | Test method/ procedure |
|-------------------------------------|---|--|--|
| Formaldehyde | coated and uncoated wood-based panels | Reference method: Emission testing in a test chamber; average of a double determination of the 28 th day as steady-state concentration; air exchange rate 0,5/h, room loading 1,8 m ² /m ³ ; partly edge sealing: perimeter/area = 1,5 m ⁻¹ | DIN EN 16516 |
| | | A19itional method: emission testing in a test chamber; steady-state concentration has to be multiplied by factor 2 | DIN EN 717-1 |
| | | Derived test methods: derived test methods are only suitable for production control. Therefore, a product specific manufacturer correlation has to be established. | z. B. EN ISO 12460-3 |
| | | Valid up to 31 December 2019: | |
| | | »Prüfverfahren für Holzwerkstoffe und Produkte aus Holzwerkstoffen« | Bundesgesundheitsblatt 34, 10 (1991), S.488-489 |
| | | Reference method: emission testinsug in the test chamber (all plain wood-based panels) | DIN EN 717-1 |
| | | Derived method: extraction method ref. to perforator method (only raw particleboards, raw MDF) | EN ISO 12460-5 |
| | | Derived method: emission testing acc. to gas analysis method (only raw plywood and coated wood-based panels) | EN ISO 12460-3 |