

Fraunhofer WKI | Bienroder Weg 54 E | 38108 Braunschweig | Germany

Marubeni Europe plc Paris Branch
5, Boulevard de la Madalaine
75001 Paris
France

Fraunhofer Institute for Wood Research
Wilhelm-Klauditz-Institut WKI

Director
Prof. Dr. Bohumil Kasal

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

Bienroder Weg 54 E
38108 Braunschweig

Bettina Meyer
Project manager formaldehyde analytics
Quality Assessment QA
Phone + 49 531 2155-375 | Fax + 49 531 2155-907
bettina.meyer@wki.fraunhofer.de
www.wki.fraunhofer.de

Your reference

Your message dated

Our reference
Mey

Braunschweig, 27 April 2017

Test report No. QA-2017-1029

Customer: Marubeni Europe plc Paris Branch
5, Boulevard de la Madalaine
75001 Paris
France

Receipt of sample: 2 March 2017

WKI-ID-No.: 0115_2017

Start of test: 7 March 2017

Objective of the test: Determination of the formaldehyde release

Content of the test report:	1. Task and test material	Page 2
	2. Execution of the test	Page 3
	3. Test result	Page 4

This test report comprises 4 pages 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-Institut für Holzforschung, Wilhelm-Klauditz-Institut (WKI), Bienroder Weg 54E in Braunschweig (Germany).

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



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

Prof. Dr.-Ing. habil. Prof. E. h. Dr.-Ing. E. h. mult. Dr. h. c. mult. Reimund Neugebauer, President

Prof. (Univ. Stellenbosch) Dr. rer. pol. Alfred Gossner

Prof. Dr. rer. publ. ass. iur. Alexander Kurz

Prof. Dr. rer. nat. Georg Rosenfeld

Cheques and transfers payable to:

Deutsche Bank, München

Account 752193300 BLZ 700 700 10

IBAN DE86 7007 0010 0752 1933 00

BIC (SWIFT-Code) DEUTDEMM

V.A.T. Ident No. DE129515865

Tax Number 143/215/20392

1. Task and test material

The Fraunhofer-Institut für Holzforschung, Wilhelm-Klauditz-Institut (WKI), was entrusted by Messrs. Marubeni Europe plc Paris Branch in 75001 Paris (France) with the determination of formaldehyde emission of a foam sample.

The test shall be carried out in reference to the EN 717-1:2005 "Wood-based panels - Determination of formaldehyde release - Part 1: Formaldehyde emission by the chamber method" considering the requirements of the German Chemikalien-Verbotsverordnung - ChemVerbotsV-, annex § 1, para 3, in relation with the publication of the Federal Health Office in the journal "Bundesgesundheitsblatt" No. 34, issue October 1991 (p. 487 – 489).

The test material was chosen, marked with

„Sample name:	VIXUM
Product Code:	IWN - 380
Manufacturer:	DONGSUNG
Production date:	-“

and sent for testing to the WKI by DONGSUNG Chemical Co. Ltd. In 604-721 Busan (Korea).

(1) Photo of the test material received:



2 . Execution of the test

The test material arrived at WKI packed in polyethylene foil on 2 March 2017, was marked with WKI-ID-No. "0115_2017" and stored under room conditions. It was unpacked on 7 March 2017.

The foam block with thickness of 380 mm received was cut to prepare samples with thickness of 50 mm.

(2) Photo of the test material prepared for testing:



(3) Samples during testing:



For the determination of formaldehyde release two samples each with the dimensions of 500 mm x 500 mm x 50 mm thickness (photo 2) and a total surface of 1 m² were put into a 1 m³ chamber (photo 3).

During the test the temperature was kept at 23°C ± 0.5 K, the relative humidity of the air was kept at 45 ± 3 % and the air exchange rate was adjusted to 1 h⁻¹. Therefore, the relationship between air exchange level and room load was 1. Prior to testing the edges were sealed gas-tight with aluminium foil to get a ratio U (unsealed edges) / A (surface area) of 1.5 m/m².

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 acetylacetone method. Sampling has been periodically continued until the formaldehyde concentration in the chamber has reached a steady-state.

The analytical and climatic test parameter above-mentioned correspond to EN 717-1:2005-01. The standard test parameters published in the German "Bundesgesundheitsblatt" No. 34, 10 (1991), page 488 - 489, to fulfill the requirements of the German Chemikalien-Verbotsverordnung - ChemVerbotsV-, annex § 1, para 3, are observed as well.

3. Test result

For the tested foam sample named "VIXUM – IWN - 380 – DONGSUNG" ordered by Messrs. Marubeni Europe plc Paris Branch in 75001 Paris (France) as tested as described in Ch. 2 a formaldehyde concentration of 0.01 ppm was determined in the 1 m³ chamber (blank value of the chamber: ≤ 0,005 ppm testing period: 243 hours – see figure enclosed – 1 ppm ≙ 1.24 mg HCHO/m³ air at 23°C and 1013 hPa).

According to the German Regulation on the Prohibition of Chemicals an admissible maximum value of 0.1 ppm of formaldehyde measured in a test chamber applies to wood-based materials, determined as an equilibrium concentration.

Requirement of limit value fulfilled?	Evaluation acc. (here: wood-based panels)	German ChemVerbotsV [BGA Blatt 34, 10/91]
Chamber method EN 717-1		<input checked="" type="checkbox"/> yes <input type="checkbox"/> no

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



Bettina Meyer
Official in charge



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

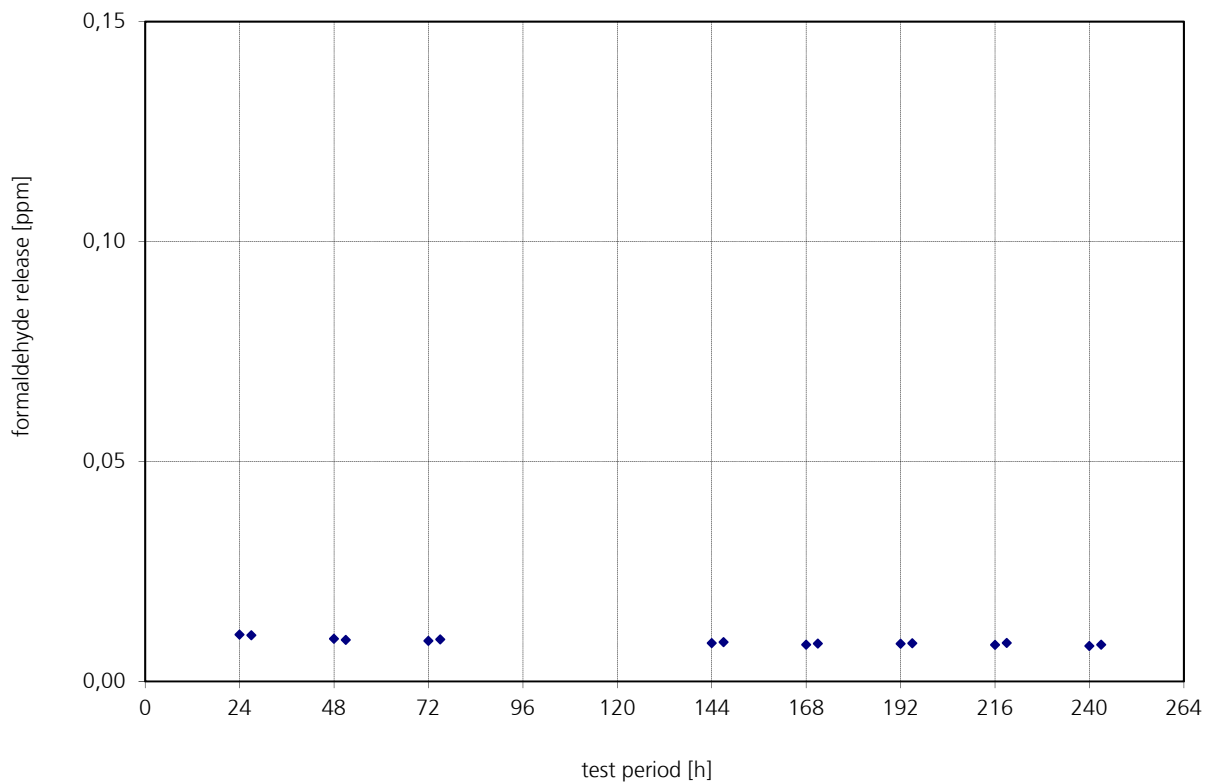


Figure: Determination of formaldehyde release using a 1 m³ chamber of a foam sample marked with "VIXUM – IWN - 380 – DONGSUNG" ordered by Messrs. Marubeni Europe plc Paris Branch in 75001 Paris (France)

Test conditions:

chamber volume	1	[m ³]
temperature	23°C ± 0,5	[°C]
rel. humidity	45 % ± 3	[%]
air exchange rate	1	[h ⁻¹]
sample dimensions	width	500 [mm]
	length	500 [mm]
	thickness	50 [mm]
number of samples	2	
emission surface area (without edges)	1	[m ²]
loading rate	1	[m ² / m ³]
ratio loading rate / air exchange rate	1	
edges	partly sealed gastight*	

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