

M. Kaindl KG / Kaindl Flooring GmbH
Sandra Grumböck
Kaindlstrasse 2
5071 Wals / Salzburg
Austria

Entwicklungs- und Prüflabor
Holztechnologie GmbH
Zellescher Weg 24
01217 Dresden

Tel.: +49 351 4662 334
Fax: +49 351 4662 211
Katharina.plaschkies@eph-
dresden.de
www.eph-dresden.de

Dresden, 10/06/2014

Test report Order no. 2214035-1

Client: M. Kaindl KG / Kaindl Flooring GmbH
Kaindlstrasse 2, 5071 Wals / Salzburg, Austria

Order date: 22.04.2014
order number (client): 1813868

Order: Determination of the antibacterial properties of surfaces
Test material: Kaindl decorative panel (melamine faced board)

Contractor: Entwicklungs- und Prüflabor Holztechnologie GmbH
Zellescher Weg 24, 01217 Dresden, Germany

Person in charge: Dipl.Biol. Katharina Plaschkies



Dr. Wolfram Scheiding
Head of Laboratory Biological Testing
Surveillance Body FPC/EUTR

The test report contains 4 pages and 1 annex with 1 page. Any duplication, even in part, requires written permission of EPH. These test results are exclusively related to the tested material.

1 Task

Determination of the antibacterial properties of surfaces

2 Test material

Kaindl decorative panel (melamine faced board)

Sample receipt at the contractor: 29/04/2014

3 Test performance

The test was carried out according to ISO 22196 (2007): Plastics – Measurement of antibacterial activity on plastics surfaces.

A defined bacteria suspension (inoculum) was spread over the specimen's surface by covering with a polyethylene film (thickness 0,065 mm). These inoculated test specimens were incubated in a humid chamber at 36 °C for 24 hours. The antibacterial activity was determined from the number of viable bacteria.

As reference sample without any antibacterial effect as well as for covering of the suspension on the specimens, a film from polyethylene was used.

Further details of the test:

Test strains	<i>Staphylococcus aureus</i> subsp. <i>aureus</i> DSM 799 <i>Escherichia coli</i> DSM 1576
Size of the specimen surface:	50 mm × 50 mm
Size of the tested surface area:	40 mm × 40 mm
Film for covering:	polyethylene 40 mm × 40 mm × 0,065 mm
Cleaning of the specimens:	disinfection by 70% ethanol
Replicates:	6 (3 specimens of the test material, 2 replicates of each dilution series)
Volume of test inoculum:	400 µl
Non-ionic surfactant:	Tween 80 (7,0 g/l)
Procedure for the determination of the viable number of bacteria:	plating of 50 µl on nutrient agar using a spiral plater, incubation at 36 °C
Period of the incubation:	24 hours, May 07 th -08 th 2014

4 Validity of the test

Table 1: Criteria for valide values

Criteria (reference material)	Demand	Determined value in the test	
		<i>Staphylococcus aureus</i>	<i>Escherichia coli</i>
$\frac{[(\lg N_0)_{\max.} - (\lg N_0)_{\min.}]}{(\lg N_0)_{\text{average}}}$	≤ 0.2	0.04 (valid)	0.02 (valid)
$N_{0\text{average}}$ [cfu/cm ²]	6.2×10^3 up to 2.5×10^4	8.6×10^3 (valid)	6.0×10^4 (slightly different)*
$N_{24\text{minimum}}$ [cfu/cm ²]	6.2×10^1	2.1×10^4 (valid)	8.1×10^5 (valid)

cfu colony forming units (viable bacteria)
 N_0 number of viable bacteria prior the incubation
 N_{24} number of viable bacteria after 24 h incubation

*) The difference is evaluated as very slight without an influence to the test result.

5 Results

5.1 Basis for evaluation

The antibacterial activity R describes the reduction of the viable bacteria on the test surface within 24 hours in comparison to the reference material.

$$R = U_T - A_T$$

U_T : average of the common logarithm of the number of viable bacteria recovered from the reference material immediately after 24 hours in bacteria/cm²

A_T : average of the common logarithm of the number of viable bacteria recovered from the test material immediately after 24 hours in bacteria/cm²

5.2 Results for *Staphylococcus aureus* subsp. *aureus*

Concentration of the inoculum: 8.5×10^5 cfu/ml (determined by counter chamber)

Theoretical recovery rate on the material: 2.1×10^4 cfu/cm²

Reference material polyethylene film

Recovery rate of viable bacteria after 0 hours: 8.4×10^3 KbE/cm² (lg = 3.9)

Recovery rate of viable bacteria after 24 hours: 4.5×10^4 KbE/cm² (lg = 4.7 = U_T)

The number of viable bacteria on the reference material increased within 24 hours by 0.8 lg-stages.

Test material Kaindl decorative panel (melamine faced board)

Recovery rate of viable bacteria after 0 hours: 1.2×10^4 KbE/cm² (lg = 4.,1)

Recovery rate of viable bacteria after 24 hours: < 6 KbE/cm² (lg < 0.8 = A_T)

Antibacterial activity ($R = U_T - A_T$) > 3.9

The number of viable bacteria on the test material decreased within 24 hours by more than 3.9 lg-stages.

5.3 Results for *Escherichia coli*

Concentration of the inoculum: 7.0×10^5 cfu/ml (determined by counter chamber)

Theoretical recovery rate on the material: 1.8×10^4 cfu/cm²

Reference material polyethylene film

Recovery rate of viable bacteria after 0 hours:	6.0×10^4 KbE/cm ² (lg = 4.8)
Recovery rate of viable bacteria after 24 hours:	9.7×10^5 KbE/cm ² (lg = 6.0 = U _T)

The number of viable bacteria on the reference material increased within 24 hours by 1.2 lg-stages.

Test material Kaindl decorative panel (melamine faced board)

Recovery rate of viable bacteria after 0 hours:	9.3×10^4 KbE/cm ² (lg = 5.0)
Recovery rate of viable bacteria after 24 hours:	< 6 KbE/cm ² (lg < 0.8 = A _T)
Antibakterielle Aktivität (R = U _T - A _T)	$> 5,2$

The number of viable bacteria on the test material decreased within 24 hours by more than 4.2 lg-stages.

6 Auswertung

Following values of the antibacterial activity were determined in the test according to ISO 22196:2007 for Kaindl decorative panel (melamine faced board):

Staphylococcus aureus: R > 3.9

Escherichia coli: R > 5.2

A clear antibacterial activity is given for R ≥ 1.


.....

Dipl.-Biol. Katharina Plaschkies
Person in charge

annex: single values

Tab. A1: Single values for *Staphylococcus aureus* subsp. *aureus*

	Reference polyethylene		Test material Kaindl decorative panel (melamine faced board)
	N_{R_0h}	N_{R_24h}	
C: determined single values [cfu/ml]	value 1	1.4×10^4	N_{T1_24h} 10
	Value 2	1.1×10^4	10
	Value 3	1.5×10^4	10
Coverage	1.4×10^4	7.4×10^4	10
V: volume of the suspension [ml]	10	10	10
A: area of the test surface [cm ²]	16	16	16
Number of the viable bacteria $N=(CxV)/A$ [cfu/cm ²]	8.4×10^3	4.5×10^4	< 6
IgN	3.9	$4.7 = U_T$	< 0.8 = A_T
Antibacterial activity $R=U_T - A_T$			> 3.9

Tab. A2: Single values for *Escherichia coli*

	Reference polyethylene		Test material Kaindl decorative panel (melamine faced board)
	N_{R_0h}	N_{R_24h}	
C: determined single values [cfu/ml]	Value 1	8.9×10^4	N_{T1_24h} 10
	Value 2	9.0×10^4	10
	Value 3	1.1×10^5	10
Coverage	9.6×10^4	1.5×10^6	10
V: volume of the suspension [ml]	10	10	10
A: area of the test surface [cm ²]	16	16	16
Number of the viable bacteria $N=(CxV)/A$ [cfu/cm ²]	6.0×10^4	9.7×10^5	< 6
IgN	4.8	$6.0 = U_T$	< 0.8 = A_T
Antibacterial activity $R=U_T - A_T$			> 5.2