

Aschaffenburg, 22 November 2023

From: Bie-schu  
Authorized by: Dr. Biester

## REPORT

**Order No.:** 20020/1-I **Page 1 of 3 pages****Client:** Vital Haus, LLC  
Pavla Shamanova street, b.5/5, of. 2  
620105 Ekaterinburg city  
Russia**Date of order:** 30 August 2023**Receipt of sample material:** 1 September 2023**Purpose:** Analysis of a HDPE corrugated pipe for antibacterial activity  
according to JIS Z 2801 / ISO 22196  
(Dr. Derra)

Managing Director

  
(Dr. Biester)Dipl.-Biologist  
*Microbiology*  
- Head of Department -

The present report exclusively refers to the samples mentioned. It meets the requirements of the DIN EN ISO/IEC 17025:2018 for simplified test reports. Additional information and statistical data on the results are available upon request.

## **Sample Material**

For analysis the following sample material was in hand:

Sample: HDPE double wall corrugated pipe

## **Carrying out of the Tests**

Examination period: 12 October 2023 to 16 November 2023

## **Test for Antibacterial Efficacy**

The determination was performed according to ISO 22196:2011\* / JIS Z 2801:2012\*.

The test specimens were contaminated with the test microorganism on the test face (inner pipe surface). Immediately after inoculation (0 h) the germ suspension was removed from some test pieces by rinsing with Neutralizing Broth and the germ count was determined. The remaining test pieces were stored in a humid chamber. After 24 hours the germ suspension was removed and the germ count on those samples was determined (24 h) as well.

The examination was performed as fourfold determination. As reference material a standard PE without equipment was used. All samples were cleaned with 70 % ethanol before the examination.

Test organism: *Staphylococcus aureus* (DSM 346)  
*Escherichia coli* (DSM 1576)

Volume of germ suspension: 400 µl per sample specimen

Sample specimen size: 5 x 5 cm

Film size: 4 x 4 cm

Neutralization broth: BD Difco D/E Neutralizing Broth

Storage conditions: 36 ± 1 °C, 24 h

Nutrient medium: PC-Agar

### **Calculation of antibacterial activity R:**

$$R = (U_t - U_0) - (A_t - U_0) = U_t - A_t$$

R = antibacterial activity

U<sub>0</sub> = average of logarithm numbers of viable bacteria [cells/cm<sup>2</sup>] immediately after inoculation on reference test pieces

U<sub>t</sub> = average of logarithm numbers of viable bacteria [cells/cm<sup>2</sup>] after 24 hours of incubation on the reference test pieces

A<sub>t</sub> = average of logarithm numbers of viable bacteria [cells/cm<sup>2</sup>] after 24 hours of incubation on the equipped test pieces

Additionally, the logarithmic and percent reductions were calculated in comparison to the average initial numbers of bacteria on the sample material.

Result:

	<i>E. coli</i>		<i>S. aureus</i>	
	Sample	Reference	Sample	Reference
Average CFU/cm <sup>2</sup> (0 h)	7.3 x 10 <sup>3</sup>	1.0 x 10 <sup>4</sup>	7.4 x 10 <sup>3</sup>	6.6 x 10 <sup>3</sup>
Average CFU/cm <sup>2</sup> (24 h)	< 1	1.5 x 10 <sup>6</sup>	< 1	2.4 x 10 <sup>4</sup>
U <sub>0t</sub> = Log CFU/cm <sup>2</sup> (0 h)	3.9 ± 0.1	4.0 ± 0.1	3.9 ± 0.0	3.8 ± 0.0
U <sub>t</sub> = Log CFU/cm <sup>2</sup> (24 h)	---	6.2 ± 0.1	---	4.4 ± 0.1
A <sub>t</sub> = Log CFU/cm <sup>2</sup> (24 h)	-0.2 ± 0.0	---	-0.2 ± 0.0	---
%-reduction (24 h)	≥ 99.99	---	≥ 99.99	---
log. reduction (24 h)	4.1	---	4.1	---
antibacterial activity R	6.4	---	4.6	---

CFU = colony-forming units

20020/1-I ≙ Corrected version; replaces test report no. 20020/1 of 16 November 2023. The client name and address on page 1 were corrected.

The accreditation applies to the methods marked with \* in the test report (Register no. D-PL-14160-01-01).

End of report

**Dr. Ralph Derra**  
Öffentlich bestellter und vereidigter Sachverständiger für  
Verpackungsmaterialien, Boden- und Luftanalysen;  
Sachverständiger in der Wasseranalytik

22 November 2023  
Dr. Dr/Bie-schu

EXPERT'S OPINION

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for Vital Haus, LLC  
Pavla Shamanova street, b.5/5, of. 2  
620 105 Ekaterinburg city  
Russia

Product FLIBEN HDPE double wall corrugated pipe


The pipe sample distributed by the company mentioned above was examined according to JIS Z 2801:2012 / ISO 22196:2011 on the inner surface for its antibacterial efficacy. As test germs *Staphylococcus aureus* and *Escherichia coli* were chosen. These organisms can cause infections in humans and animals. Especially in the clinical sector they are responsible for a variety of secondary infectious diseases.

The results are summarized in the test report 20020/1-I dated 22 November 2023 of the company ISEGA Forschungs- und Untersuchungsgesellschaft Aschaffenburg, Germany.

After contact of the test germs for 24 h at 36 °C with the product mentioned above, a reduction of the germs of 99.99 % compared to the initial number of germs at the beginning of the test was detected. Furthermore, a logarithmic reduction of above 4.0 in comparison to the initial colony count was determined.

These results verify a very high antibacterial activity of the product against the tested germs.



  
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