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Our reference: W-281392e-17-Bar
Responsible: Dipl.-Ing. (FH) S. Horn

Gelsenkirchen, den 28.03.2017

TEST REPORT

Test of the microbial metabolisation pursuant to DIN EN ISO 846 (10/1997) methods A and C

Client:	ALARKO CARRIER SANAYI VE TICARET A.S. GOSB – Gebeze Organize Sanayi Bölgesi Sahabettin Bilgisu Cad. 41480 Gebze - KOCAELI
Ordering Date:	written order on 30.01.2017
Test material:	“PVC materials for PVC door profile, PVC strip or flexible duct connectors”
Size/ colour of the test object:	light grey, marmorate plates of plastic, 5 cm x 5 cm
Date of receipt of test samples:	31.01.2017
Commencement of tests:	22.02.2017 (method A) 23.02.2017 (method C)
Case handler:	Dipl.-Ing. (FH) S. Horn
Our reference:	W-281392e-17-Bar
Scope of the report:	5 pages

1. Preliminary remark

For the usability of structural elements and appliances it is crucial to determine the properties of all used materials with regard to bacteria and moulds because these pose a potential risk of infection for humans. Furthermore, materials that promote the growth of microorganisms usually require a higher level of cleaning and disinfecting maintenance for the respective components and appliances.

2. Implementation

Testing was performed pursuant to DIN EN ISO 846 „Evaluation of the effect of microorganisms on synthetic materials“, methods A and C. The evaluations were based on visual assessment.

This test is used to evaluate the behaviour of materials regarding the influence of specific moulds and bacteria.
Using methods A and C it can be determined - under respective test conditions (pursuant to DIN EN ISO 846) - whether the test materials behaviour remains inert or if it serves as a nutrient source for moulds (method A) and bacteria (method C).

Method A (Testing of the resilience towards moulds):

The samples were disinfected with an Ethanol- water mixture prior to the attempt.

Preparation of a spore suspension with the following test moulds:

- *Aspergillus niger* ATCC 6275
- *Penicillium funiculosum* CMI 114933
- *Paecilomyces variotii* ATCC 18502
- *Gliocladium virens* ATCC 9645
- *Chaetomium globosum* ATCC 6205

Application of specimens onto a carbon-free* or low-carbon culture medium and inoculation of specimens with the spore suspension (5 parallel sets),
Preparation of 3 parallel sterile samples onto each of which 3 ml of ethanol-water-mixture is pipetted in a mass ratio of 70: 30,
Incubation of test specimens over a period of 4 weeks at a steady temperature of 24 $\pm$ 1°C and a relative humidity of > 95%,
Visual inspection of the test specimens with the naked eye as well as with a stereoscopic microscope (at 50 x magnification) for mould growth after 2 weeks and after 4 weeks followed by an evaluation of the growth in comparison to the control samples.

* - terminology pursuant to DIN EN ISO 846

Method C (Testing of the resilience towards bacteria):

The samples were disinfected with an Ethanol- water mixture prior to the attempt.

Preparation of a bacteria suspension with the following test strain:

- *Pseudomonas aeruginosa* ATCC 13388

Blending of said bacteria suspension with a carbon-free* or low-carbon culture medium which was liquefied and cooled down to 45°C,
Filling the Petri dishes with the inoculated agar,
Placing the specimens onto the cooled agar and then dousing the specimens with the inoculated agar (approx. 1mm cover layer on the specimens) (5 parallel sets),
Preparation of 3 parallel sterile samples onto each of which 3 ml of ethanol-water-mixture is pipetted in a mass ratio of 70 : 30,
Incubation of test specimens over a period of 4 weeks at a steady temperature of 29 ± 1°C and a relative humidity of > 95%,
Visual inspection of the test specimens with the naked eye as well as with a stereoscopic microscope (at 50 x magnification) for bacterial growth after 2 weeks and after 4 weeks followed by an evaluation of the growth in comparison to the control samples.

3. Evaluation

The evaluation of the microbial growth on the test specimens was done according to Table 1 and in comparison to the control samples

Table 1: Evaluation of the microbial growth (pursuant to DIN EN ISO 846)

Growth intensity	Evalution
0	no growth on microscopic examination identified
1	no growth visible to the naked eye but clearly visible under the microscope
2	Growth visible to the naked eye, up to 25% of the sample surface covered
3	Growth visible to the naked eye, up to 50% of the sample surface covered
4	significant growth, over 50% of the sample surface covered
5	strong growth, entire sample surface covered

* - Terminology pursuant to DIN EN ISO 846

The interpretation of the results according to methods A and C was conducted pursuant to or respectively following Table 2

Table 2: Interpretation of the results according to methods A and C (pursuant to DIN EN ISO 846)

Growth intensity	Evaluation of the test material
0	Material is not used as a nutrient for microorganisms, it is "inert" or "fungistatic" / "bacteriostatic"
1	Material contains nutrients and is only slightly soiled, so that only slight growth is possible
2 bis 5	Material is not resistant to microorganism infestation and provides nutrients for the development of microorganisms

4. Test results

Table 3: Test results

Test material	Growth intensity of the microbial growth according to Table 1	
	Method A	Method C
"PVC materials for PVC door profile, PVC strip or flexible duct connectors"	0	2
	0	2
	0	2
	0	2
	0	2

None of the specimens pursuant to method A showed fungal growth in comparison to the negative control samples.

On each of the five specimens pursuant to method C in comparison to the negative control samples, bacterial growth could be identified by the naked eye. Here up to 25% of the specimen surface was covered.

This signifies that the material “PVC materials for PVC door profile, PVC strip or flexible duct connectors”, evaluated in accordance with DIN EN ISO 846, can serve as a nutrient for microorganisms (see table 2, growth intensity 2), because under the afore mentioned test conditons a bacterial growth was detectable.

Thus, the tested material does not meet the requirements for microbial metabolic properties in accordance with VDI 6022, sheet 1 (07/2011).

Gelsenkirchen, March 28th 2017

The Director of the Institute
p.p.

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