FS014
C & C
EDITION

Bostik
smart adhesives

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Fungi resistance of sealants

FACTSHEET

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GLOBAL LEADER IN ADHESIVE TECHNOLOGIES

Bostik is one of the largest adhesive and sealant companies. Worldwide, we employ some 6,000 people in 50 countries across five continents. Our customers come from diverse markets, most notably the industrial manufacturing, construction and consumer sectors.

SMART INNOVATIONS

Our smart identity is underpinned by innovation. We pursue innovation vigorously, applying the latest technological advances to developing 'smart' adhesives. Our archives are laden with examples of Bostik technologies that have disrupted markets - from potato starch-based wallpaper paste to elastic attachment adhesive for diapers.

Today, our commitment to innovation is as strong as ever. We innovate with our customers through a global R&D network, comprising three international Smart Technology Centres and 11 regional centres. And we differentiate our business through this investment. That's why in 2014, 15% of Bostik sales came from products launched in the previous three years.

Fungi resistance of sealants

GENERAL INFORMATION

Where products are used in wet areas like kitchens, bathrooms, swimming pools, abattoirs, cooling rooms, storage - and production rooms for food, fungal growth can occur. As a result of temperature, humidity, soap residue and traces of fungi in the air fungi can start growing on wet surfaces and is difficult to remove. This can happen on sealant joints. Fungi can develop at a humidity of 65% and grow even faster at higher humidity.

PREVENTION OF FUNGAL GROWTH

Good ventilation / climate control and prevention of soap residues can minimise fungal growth. This is not always possible, making the use of fungi static sealants in certain areas necessary.

THE USE OF FUNGISTATIC SEALANTS

Fungistatic sealants contain fungicide. This fungicide slightly dissolves in water which is how it is spread over the sealant surface. Traces of fungi that would settle on the surface of the sealant will be restricted in their growth and not be able to develop any further. Because of the slight solubility in water the fungicide will leach from the sealant over time, allowing the fungistatic properties to be lost. This will be accelerated if the areas are cleaned with warm water or water under high pressure. By using chemical cleaning agents or dissolving agents for grease the fungicide can quickly be leached out of the sealant. If aggressive detergents are used (specifically chlorinated detergents like bleach or sodium-hypo chloride), the fungicide can be attacked and become useless.

SPECIFICATIONS

ASTM G21 – Antifungal Test

ASTM G21 is a standard antifungal product test for determining fungal resistance of plastics and polymeric materials. Synthetic polymers are generally resistant to fungi, but the additives (such as colorants, stabilizers, and plasticizers) used in the polymer may not be. These additives may contribute to the fungal growth and unsightly conditions. Products made of plastics and foam are commonly tested with ASTM G21 but the method can also be used for a wide range of other materials and products.

ASTM G21 is useful for interior products including vinyl, foam, gaskets, and rubber and is often used for materials in plumbing, baths, and bedding. ASTM G21 is also used for outdoor products such as sidings, shingles, pool covers, marine plastics, fishing and boating gear, footwear, sporting goods and polymeric coatings.

ASTM G21 consists of exposing plastics and other materials to a fungal inoculum over 28 days of testing. A mixed fungal inoculum is standard, but individual fungi can be requested as an alternative.

The ASTM G21 test method challenges materials with a wide variety of fungal species, ranging from common environmental fungi to agricultural pathogens and even antibacterial compound producing fungi, all of which have different growth requirements and enzymatic properties.

ISO 846 - Antimicrobial Test

The ISO 846 evaluates the effects and propagation of bacteria on plastic materials that are exposed to the environment. The 4 options for ISO 846 (A, B, C, and D) include tests for fungi, bacteria separately and in the mixed inoculum. The ISO 846 test method is often used for plastic exposed to the environment but is not intended to test porous materials like plastic foams. ISO 846 determines deterioration of plastics due to fungi and bacteria and other soil microorganisms. However, this method does not determine the biodegradability of plastics. Volume of testing and test strains used should be determined before testing and should reflect the intended application for the plastic.

Antimicrobial testing aids product development and supports a well-structured Quality Control program. It can be challenging and time consuming knowing which antimicrobial test method to use for product testing; with a variety of antimicrobial test methods available, Situ Biosciences' product test laboratory can assist with the planning process and initiate testing based on the project requirements and the intended use or application of the product. Inquire with the lab for guidance on the different available antimicrobial test methods and to determine which method is most appropriate for a product's testing requirements.

Method A is a fungal growth test that challenges materials against a mixed fungal inoculum. This ISO 846 method evaluates the inherent resistance of plastics to fungal attack without exposure to organic matter.

Method B is an inhibition test that is composed of two components that determine the fungistatic activity of treated plastics. Similar to Method A, Method B exposes the test samples to a mixed fungal inoculum; however method B includes a carbon source in the testing media. It is recommended to perform Method A and both components of

Method B simultaneously for testing.
Method C determines a materials resistance to bacteria using an incomplete media. If there is no growth in the agar around the test sample, then the test sample does not contain any nutrients.
Method D determines a materials resistance to microbially active soil in a soil burial test. This component was included in the ISO standard, because many plastics are used in environments where they are constantly exposed to soil and high humidity's.

CE MARKING

In today's world globalization and harmonization have become commonly used and familiar terms. This is also true in the building standards and regulations. Within Bostik we embrace and empower this movement and strive for a globalized standard which provide transparency and simplicity sealing and bonding. One of the most familiar (and for Europe mandatory) standards in the sealant industry is the CE Classification, or also known as the standard EN 15651.

EN 15651-3 SEALANTS FOR SANITARY deals with joints in sanitary areas inside buildings exposed to non-pressurized water. This includes joints in:

- Bathrooms
- Toilets
- Showers
- Domestic kitchens

Please note applications for service and drinking water, underwater (swimming pools, sewer systems, etc.) and applications in contact with food do not fall under the scope of this standard!

There are two main classes within the scope of the EN 15651-3:

- The 'S' class, which refers to a maximum shrinkage of ≤ 55% of the applied sealant
- And the 'XS' class, which refers to a shrinkage of the applied sealant ≤ 20%.

The resistance to flow shall be measured accordingly EN ISO 7390. Within both classes 'Type S' and 'Type XS' a range between 1 and 3 provides information on the mold growth intensity. When combined this will give the following table:

Application	Class	Shrinkage	Mould growth intensity	Resistance to flow
Type S	S1	≤ 55%	0 - 1	< 3 mm
	S2		2	
	S3		3 - 5	
Type XS	XS1	≤ 20%	0 - 1	< 5 mm
	XS2		2	
	XS3		3 - 5	

Mould growth intensity:
0. No growth apparent under the microscope
1. No growth visible to the naked eye, but clearly visible under the microscope
2. No growth visible to the naked eye, covering up to 25% of the test surface
3. No growth visible to the naked eye, covering up to 50% of the test surface
4. No growth visible to the naked eye, covering more than 50% of the test surface
5. Heavy growth, covering the entire test surface

PREVENTIVE

- Apply always the correct product
- Keep humidity levels below 65% by ventilating
- Regular cleaning
- Cleaning with chlorine-free products (e.g. denatured alcohol)
- Angled joints

SUMMARY

The use of fungistatic sealants does usually prevent or minimize fungal growth on the sealant surface. However, depending on the circumstances in respect to cleaning or traces of different fungi being present in the area, it cannot be excluded that after some time fungal growth could occur on the sealant surface.

For this reason it is not possible to guarantee or give a time estimation on the performance of the fungal properties of the sealant.