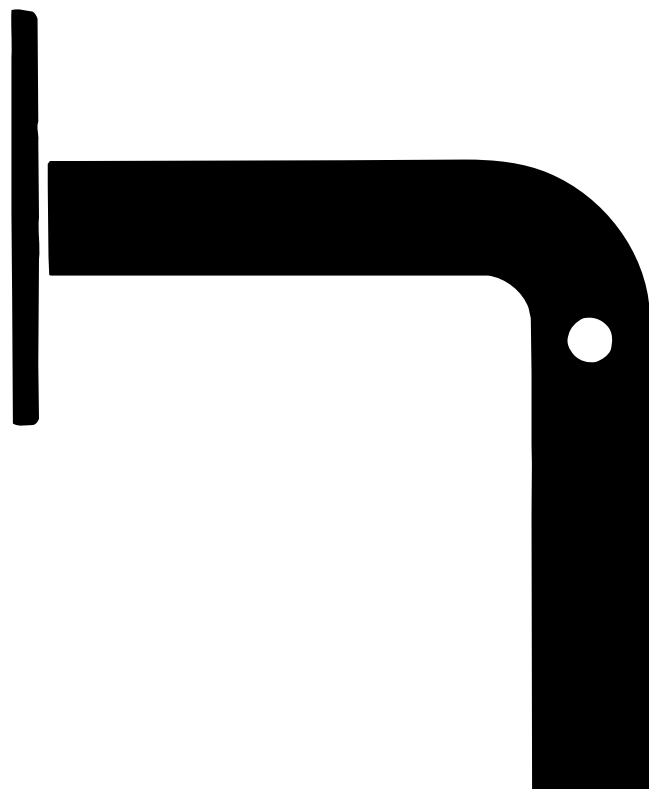


**X-BAC® coating**  
**31.03.20**



## **X-BAC® coating** introduction

Bacterial infections are a serious and rapidly growing problem. The widespread use of antibiotics has caused that we are exposed to an increasing number of resistant bacteria that are difficult or even impossible to treat.

In parts of the health sector infections and bacteria spread are serious problems especially in nurseries, kindergartens and nursing homes, where children, the elderly and weakened persons are particularly vulnerable.

A major cause of infection is that bacteria and viruses are transmitted by contact with infected objects. It may be objects that are touched by many people such as door handles, electrical switches, toilet seats, furniture and toys etc.

Antibacterial surfaces can make an important contribution to reducing the further spread of bacteria. X-BAC® coating is a unique patented anti-bacterial coating which can be applied to both metal, plastic, and a variety of other materials. The coating breaks down bacteria, viruses and fungi particularly effectively. It has been tested at Fraunhofer Institute in Germany, which proves that X-BAC® far exceeds JIS Z 2801 standard requirements. In addition to the tested E. coli bacteria and MRSA, the coating is effective against a wide range of other bacteria, viruses, and fungi. The coating is also tested at the Danish National Hospital (Rigshospitalet) Infection Hygiene Department.

X-BAC® coating does not contain silver or nanomaterials, it has no harmful effect on humans, and it is approved for use on surfaces in contact with food. Unlike most antibacterial materials based on nano silver the X-BAC® coating antibacterial effect has an extremely long durability that far exceeds normal industrial product life.

The coating is available as transparent or colour and gloss. Properties of the surface with respect to abrasion, scratch resistance, chemical resistance and UV-resistance surpasses the properties of the typical engineering plastic types. X-BAC coating is the ideal antibacterial solution for products used by many people in public spaces, hospitals and institutions.

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## **X-BAC® coating** technical details

X-BAC® varnish effectively eliminates a wide range of bacteria, viruses and fungi. The antimicrobial effect of the coating is based on a patented additive system. The varnish contains no harmful substances, silver, nano silver or other nanoparticles.

Coatings with this product complies with the specifications beneath and can be marketed with the X-BAC® brand.

### **The coating is tested against the following bacteria:**

- **E Coli** (representative of Gram-negative bacteria), complies with JIS Z 2801 )1.
- **Pseudomonas Aeruginosa**, complies with JIS Z 2801 ).
- **Staphylococcus Aureus** ATCC 6538 (representative of Gram-positive bacteria) complies with JIS Z 2801 )1.

### **The antimicrobial additive is further tested against the following microorganisms:**

Enterococcus Faecalis  
Staphylococcus Aureus  
Bacillus Subtilis  
Streptococcus Pyogenes  
Klebsiella Pneumoniae  
Pseudomonas Aeruginosa  
Escherichia Coli  
Salmonella Choleraesuis  
Salmonella Enteritidis  
Legionella  
Candida Albicans  
Aspergillus Niger  
Penicillium Funiculosum DSM  
Paecilomyces Variotii DSM 1963  
Giocladium Virens DSM 1963  
Chaetomium Globosum DSM 1962  
Various algae

### **Biocompatibility**

The antimicrobial effect of the coating is based on metal ions. The additives have no harmful or hazardous effect on human cells. Resistance formation is also excluded.

### **Long-term Effect**

The calculated durability of the antimicrobial effect of X-BAC® far exceeds normal industrial products lifetime )2 . The real life is only limited by the durability of the coating and the underlying material )3.

### **Particle Size**

The antimicrobial additives particle size is 1-14µm and significantly larger than for nanomaterials. Thus, the concerns and warnings that occur in connection with nanomaterials are not relevant to X-BAC®.

**The additives are not listed in any negative lists and they are listed in the inventory lists or positive lists for chemical substances of the following countries:**

Canada DSL / NDSL	Japan (ENCS)
USA (TSCA)	Korea (ECL)
Europe (EINECS / ELINCS)	Philippines (PICCS)
China (NEPA)	Australia (AICS)

**The additives comply with following standards and regulations:**

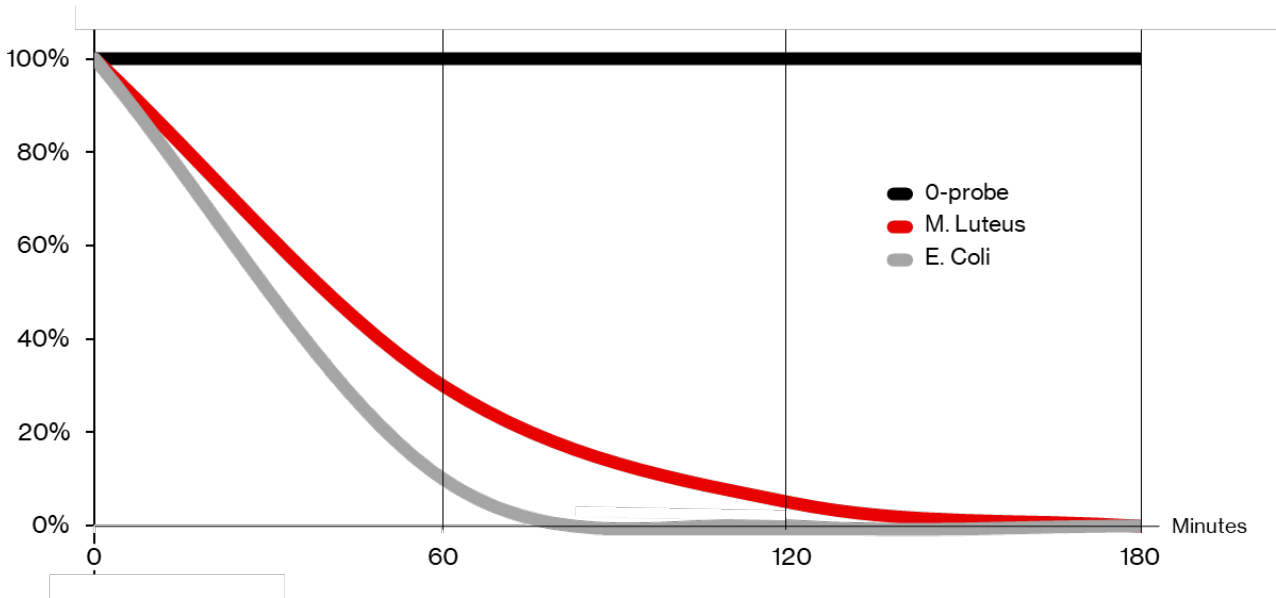
- **Safety of toys** European Norm I En71, part 3.
- **Heavy metal purity requirements** of EN71, part 3.
- **European Resolution AP (89) 1** The substances fulfill the heavy metal purity requirements therefore they can be used for food packaging.
- **Europe Food Contact** European Norm 2002/72/EG from 10. April 1992, 23 December 1997, 23. September 2009. Substances comply with EU-directive 2002/72/EC
- **USA** The substances are listed under 21 CFR and can be used as additive for food contact polymers. Such use complies fully with the Federal Food, Drug and Cosmetic Act and all applicable food additive regulations.
- **Japan** The substances comply with the requirements of JHOSPA.
- **EC** Due to the applied ingredients and the functional principle the coating is not subject to the Biocide Directive 98/8/EC.

)1 The JIS Z 2801 standard requires a reduction of  $> \log_2$  bacteria after 24 hours, this requirement is met by X-BAC® in less than 3 hours. A non-standardized and more practice-related test at 'Rigshospitalet, Copenhagen' (the Danish National Hospital) with *Cerratia marcescens* bacteria showed a very high bacterial reduction in less than 45 minutes. The bacteria were transferred as by fingerprints and the sample was kept at room temperature.

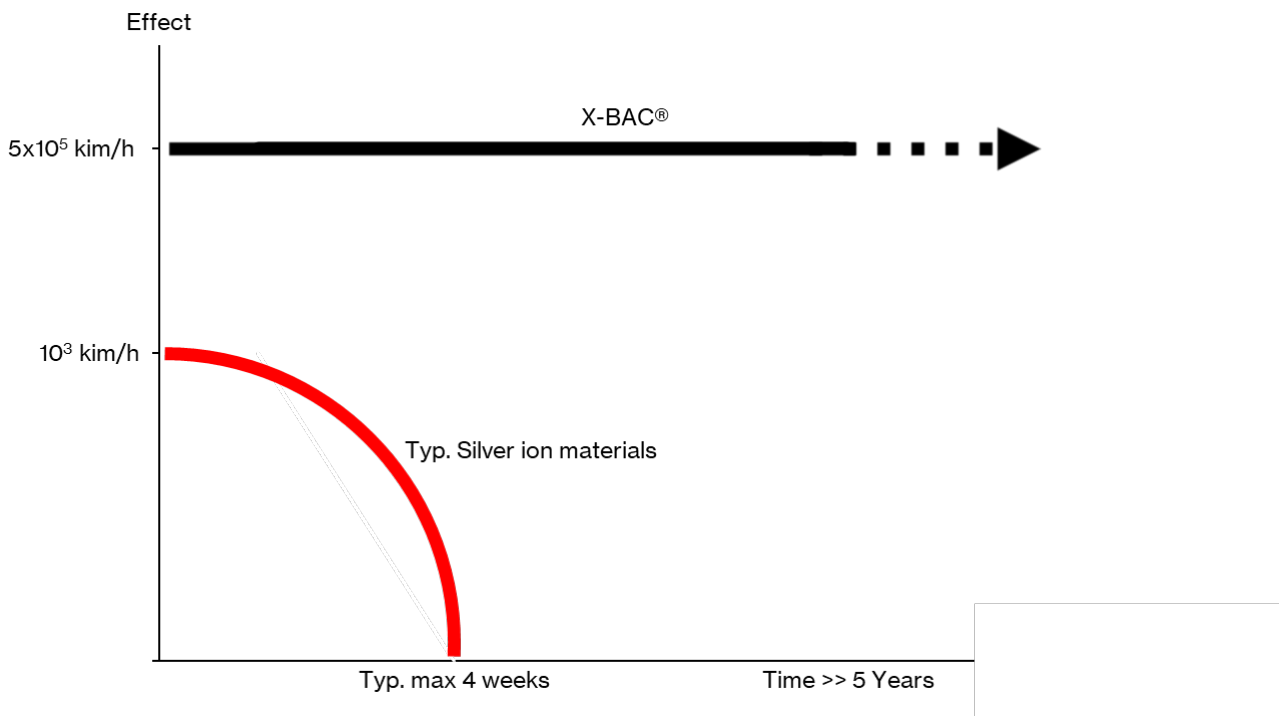
)2 The JIS Z 2801 standard does not include testing or documentation of the antimicrobial durability or life, and it therefore provides no information on the effect's duration, or lifetime. A series of tests and studies have shown that typical nano silver-based products have an extremely limited durability with lifetimes down to a few weeks.

)3 The mechanical properties of the X-BAC® coating such as wear resistance, scratch resistance, chemical and UV resistance exceeds the properties of many typical engineering plastic materials. See following graph:

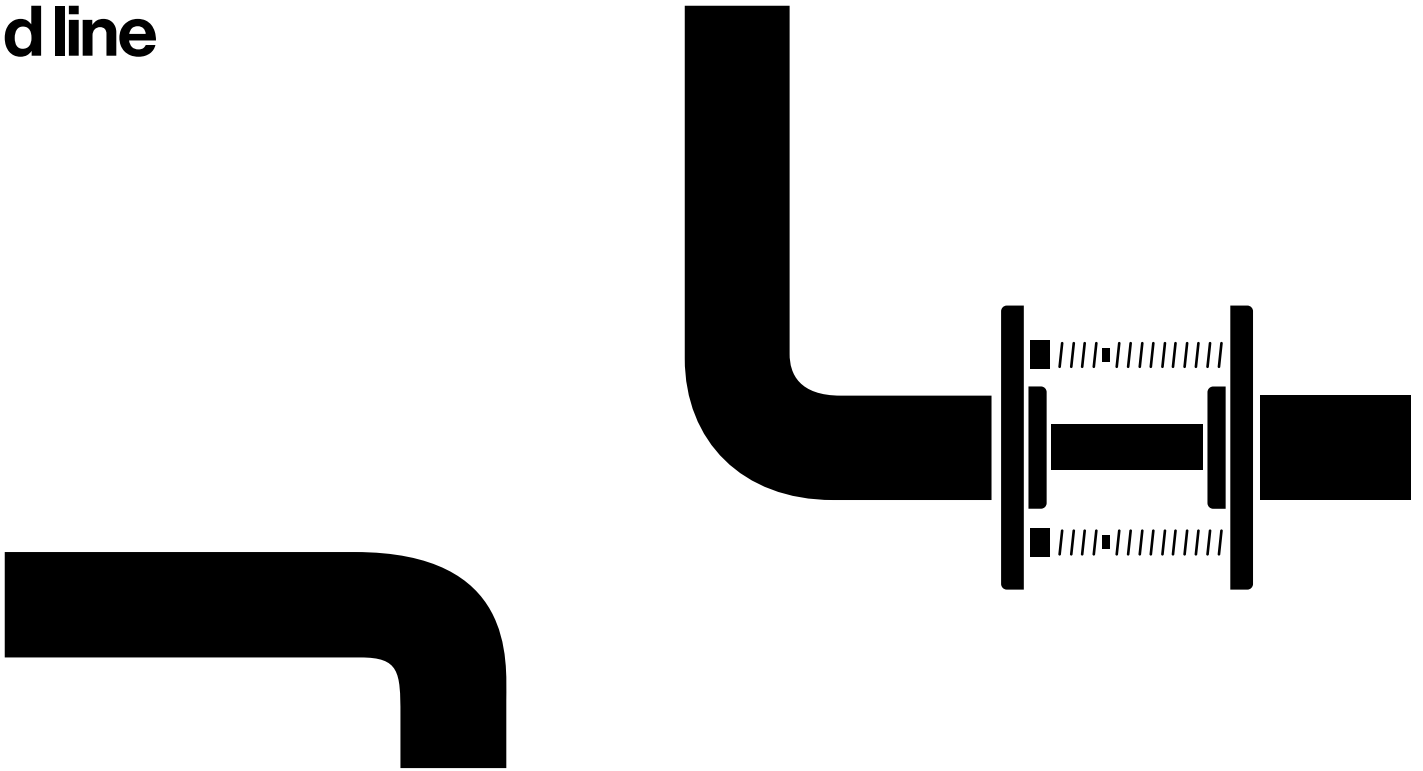
**Bacteria units:**



**Bacteria reduction for X-BAC®:**



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