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Silver Antimicrobials In Polymer Applications

- Inorganic broad spectrum antimicrobial
- Active against Gram-positive, Gram-negative bacteria, mold & yeast
- High heat resistance – up to 800 °C
- Long life efficacy –
- slow release of Silver-ions out of Zeolite or Glass matrix
- Silver-ions are bounded via ion - ion interactions
- Highly effective & stable – Does not vaporize nor decompose
- Non toxic

Silver antimicrobials

B 512

- based on Ag-Zeolite +
- semi-migratory
- no/low discoloration

Mode of action – Bactericide

- active species is the Silver-ion (Ag⁺)
- Ag⁺ is taken up by the cell membrane and inside the cell
- Ag⁺ interferes with R-SH, R-SS-R and R-NH groups
- these groups are part of proteins (e.g. enzymes) and nucleic acid (DNA)

- binding to DNA interferes with DNA replication
- binding and denaturation of bacterial respiratory enzyme system
- osmotic pressure can not be maintained (cell leaks out)
- enzymes are vital in the cellular generation of energy
- disruption of the bacterial cell

Regulatory Status

- General use for plastics
- EC all components on EINECS
- Products notified within European Biocide Product Directive

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- USA B 5000 EPA / FIFRA registration
- Asia : no specific approval needed
- Food contact approval
- FDA : B 5000
- EC : pending
- Japan : pending

Antimicrobial test: PP injection molded part

Silver antimicrobial prevents growth of bacteria, mold and yeast on plastic surfaces. Therefore it provides odor control, hygiene maintenance and the possibility for product differentiation. The combination of low migration rates and high melting point makes it especially suitable for high processing and use temperatures as well as for thin layers. It gives durable efficacy even with thin plastic articles. Silver antimicrobial has been optimised with respect to color retention under sun light exposure.

Applications: bottles, bristles, building materials, filters, food handling equipment, food processing equipment, films, kitchen and bathroom hardware, fibers, fabrics, hospital textiles, waste containers, shower curtains, sport equipment, packaging materials, drinking water systems, etc.

Test: Film Contact Method, *Staphylococcus aureus*

	Initial concentration cfu/ml	Reduction of bacteria	Concentration at the end cfu/ml
Antimicrobial Plastic	2,94*10E5	>10E5	0
Reference	2,94*10E5	<10E1	6,23*10E4

Zeolite is nanoporous material. Silver is bound into the pores and released when moisture and micro-organisms are present.