

# SILVERTEX. TECHNOLOGY

## Automatic preservation technology without dosing, energy and maintenance effort

The Silvertex material effectively impedes the growth of microorganisms in water supplies through its antibacterial properties. It thus inhibits the formation of biofilm and the resulting microbial contamination, which is often associated with high cleaning or maintenance costs.

The open design of the Silvertex material allows free flow of water through the structure. Its high effective surface area enables self-regulating release of silver ions into the surrounding fluid. Due to its flexible shape, the Silvertex material can be inserted into almost any cleaning and maintenance opening.

## Mechanism of action

When the metallic (elemental) silver comes into contact with the oxygen-containing water/fluid, Silver ions are released from the silvered threads (solvation) and move into the liquid phase (fluidisation). The positively charged Ag ions associate with the negatively polarised membranes of microorganisms. From this, initially electrostatic interaction, a multitude of chemical reactions develop. Several proven mechanisms of action against microbes now lead to metabolic disorders, structural deformations, and the inability to reproduce... this ultimately leads to cell death. This process is called the oligodynamic effect and describes the damaging effect of metal cations on microbes and bacteria.

- Complexation with DNA/RNA
- Reactions with cytochromes
- Alteration of membrane permeability
- Blocking of thiol groups of enzymes (-SH → SAg, e.g. inhibition of lactose dehydrogenase, glutathione peroxidase)
- Reaction with carboxyl (-COOH) and amino (NH<sub>2</sub>) groups, etc.



## How is the effective concentration of Ag<sup>+</sup> ions is adjusted?

Only the concentration of free solvated Ag<sup>+</sup> ions functions as the antimicrobial effective concentration. The concentration of free silver ions in water and aqueous fluids depends to a large extent on which other substances (ions, complexing agents, etc.) are contained in which concentrations in the respective fluid. This fact is exemplified by the chloride (Cl<sup>-</sup>) ions contained in practically all natural drinking water, according to the law of mass action:

$$c(\text{Ag}^+) = 1.17 \times 10^{-10} / 1.3c(\text{Cl}^-)$$

If corresponding chloride concentrations (Cl<sup>-</sup> in [mg/L] or [mmol/L]) are used in this relationship, the silver ion concentrations resulting under these concentration conditions are as follows:

Active substance: Silver (Ag<sup>+</sup>) CAS.-No.: 7440-22-4

CL <sup>-</sup> [mg/l]	CL <sup>-</sup> [mol/l]	Ag <sup>+</sup> [mol/l]	Ag <sup>+</sup> [µg/l]
10	0.28	4.67	50
20	0.56	2.33	25
.	.	.	.
60	1.69	0.77	8
.	.	.	.
100	2.82	0.46	5

### Areas of application

- RVS, Motorhomes, Campers, Towable RVS
- Mobile homes
- Boating, Yachting
- Food trucks
- Sport bottles, Drinking bulbs
- Airplanes
- Trains
- Buses
- Trucks
- Air conditioner
- Humidifiers
- Water dispenser
- Ice maker
- Water wall
- Fountains
- Process water
- Circulating water or fluid system
- Car washes
- Cooling water
- Emergency shower
- Cooling tower
- Drinking water tank
- Graywater tank
- RO water reservoir
- Rainwater tank
- Emergency drinking water
- AHU (air handling unit)
- Fire extinguishing system
- Pool

### Durability and shelf life

In contact with water/fluids the duration of use depends on the respective application and is usually 3-12 months.

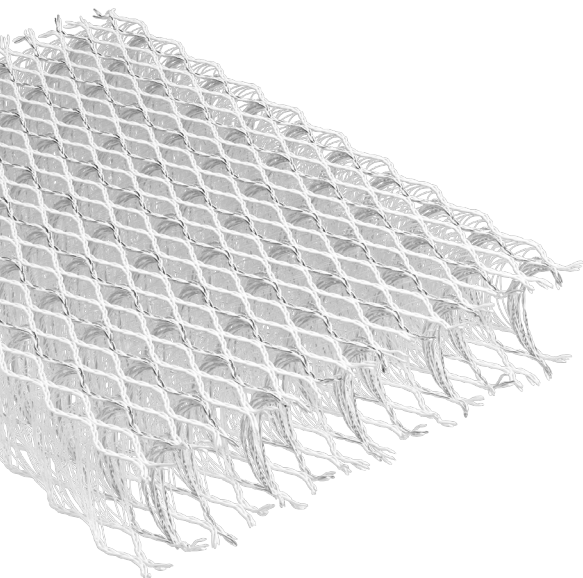
### Available sizes

- prefabricated (freely scalable product sizes)
- private label on request

### Silver as a preservative

Silver-based products have been used to keep drinking water fresh since Charlemagne. At that time, in the form of silver vessels in which the drinking water was stored, nothing was known about the specific mode of action of silver. Today we know that it is the positively charged silver ions that dock onto the microorganisms and pathogens and disrupt the metabolism of the bacteria or lead to cell death in several different mechanisms of action.

Silvertex is manufactured from high quality ingredients, specifically approved for use in preserving drinking water and fluids.



# ANTIBACTERIAL EFFECT INHIBITS HYDROPHILIC GERMS & PATHOGENIC BACTERIA

## Test conditions

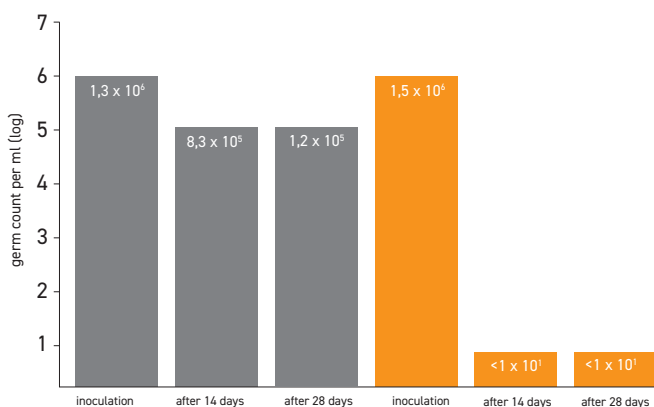
The tests were commissioned from the German laboratory GLU (Gesellschaft für Lebensmittel- und Umweltconsulting mbH). They were performed in accordance with Ph. Eur. 10.0, Methode 5.01.03.00 preservative exposure test "test for sufficient antimicrobial preservation". The average silver ion concentration during the test period was 29,8 µg/L drinking water.

### Antibacterial efficacy

#### Experimental germ: enterococci

Testing method according to EN ISO 9308-1 : 2017-09  
Direct application of 1ml in repeat determination

■ blind sample  
■ with Silvertex

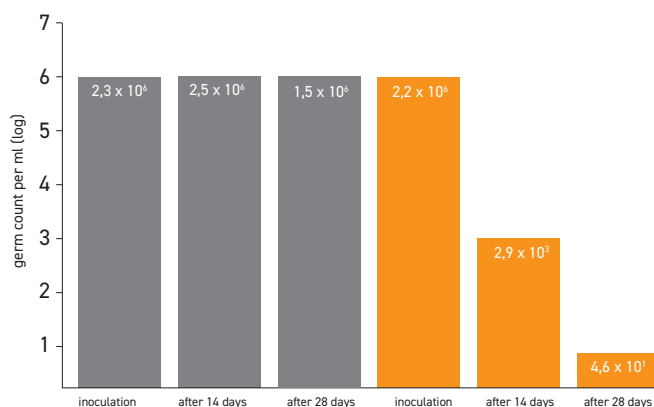


### Antibacterial efficacy

#### Experimental germ: coliforme germs

Testing method according to EN ISO 9308-1 : 2017-09  
Direct application of 1ml in repeat determination

■ blind sample  
■ with Silvertex

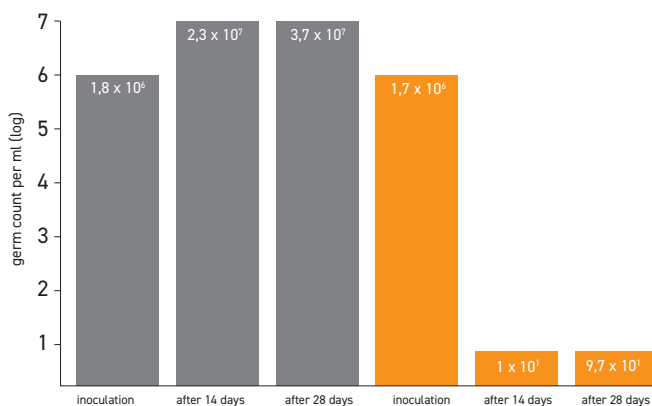


### Antibacterial efficacy

#### Experimental germ: Pseudomonas aeruginosa

Testing method according to EN ISO 9308-1 : 2017-09  
Direct application of 1ml in repeat determination

■ blind sample  
■ with Silvertex



### Antibacterial efficacy

#### Experimental germ: e.coli

Testing method according to EN ISO 9308-1 : 2017-09  
Direct application of 1ml in repeat determination

■ blind sample  
■ with Silvertex

