

# CrownTech™ - Technical Bulletin No. 11

## Silver® Optional Antimicrobial Additive

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### INTRODUCTION

Silver (sodium hydrogen zirconium phosphate) is an antimicrobial agent that works to inhibit the growth of microorganisms on the surface of Crown Polymers epoxy, polyaspartic, polyurea and polyurethane floor and wall surfacing products.

### US EPA and US PATENT NUMBER

The active ingredient in Silver is an EPA registered non-heavy metal alternative biocide for epoxy floor and wall systems. EPA Regulation Number 11631.2. US Patent Number US 9,247,736 B2.

### GRAM-NEGATIVE & GRAM-POSITIVE BACTERIA

In 1884, Dr. Christian Gram introduced Gram's Staining Techniques and Classification of bacteria, which became known as Gram-negative and Gram-Positive. Gram's staining techniques help determine the bacteria's cell size, structure and configuration.

1. Cell wall structure identifies whether cell is Gram-positive or negative in nature.
2. During the procedure, cells are stained by a primary stain and secured by a mordant.
3. At that time, some bacteria have the ability to hold or retain the primary stain by counterattacking decolorization.
4. While some bacteria decolorize by the use of a decolorizer, the bacteria which retains its primary stain is called Gram-positive. The bacteria which decolorizes is called Gram-Negative.
5. Crystal violet (CV), when dissolved in water, makes

- CV+ and Cl- ions in its solutions. These ions infiltrate by a cell wall and cell membrane. This happens in both Gram-negative and Gram-positive cells. The CV+ ion interrelates with (-) negative charge bacterial cells components and gives a purple stain to the cell.
6. Iodine (I) is a mordant that intermingles with CV+ cells and produces large multiplexes of violet crystal.
  7. When alcohol or acetone as decolorizer is added it reacts with cell membrane lipids.
  8. Gram negative cells have 1-2 very thin layers of peptidoglycan, as well as a layer of lipopolysaccharide, which is dissolved by adding alcohol.
  9. Due to this ability Gram-negative cells are unable to recollect the complexes and decolorize when the agent is washed.
  10. Gram-positive cell walls are porous and retain the stain.
  11. After the decolorization procedure, Gram-positive cells retain their purple, and in contrast, Gram-negative cells lose their purple color.
- Note: Numbers 1-11 are taken from [ibiologia.com/gram-staining](http://ibiologia.com/gram-staining).

### EFFICACIOUS TESTING of SILVER®

The biocide in Silver is effective against Gram-negative and Gram-positive bacteria, fungi, mold, mildew and yeast. The active ingredient inhibits the growth of microorganisms by arresting colony growth.

Silver arrests the growth of algae, bacteria, mildew, mold and yeast on contact. However, unlike some of our competitors, Crown Polymers makes no claim for the system being efficacious against viruses, because those claims are untruthful and misleading. Generally speaking, viruses do not survive outside of their host and will perish on their own in a relatively short period of time with or without contacting a biocide or bio-stat.

Silver is chemically engineered to become an integral part of the cured Crown Polymers floor and wall surfacing material. The anti-microbial agent in Silver is added to the products during the manufacturing process. When the resin containing the anti-microbial agent and hardener are mixed at the jobsite the Silver is chemically "tied-up" in the cured product, becoming an integral part of the floor or wall systems for the life of the product.

## CROWN POLYMERS INERT PRODUCTS

Even without the addition of Silver, Crown Polymers floor and wall systems, when properly cured are considered to be inert, therefore they are “passive antimicrobial.” Inert products are a non-food source for microorganisms, unlike other floor and wall surfacing. Most other floor and wall surfacing materials, such as, paint, acrylic grouts, carpet, wood, etc. actively support the growth of microorganism colonies, because they are a “food source” for the microorganisms.

## FOOD CONTACT

Food Contact - Government Agencies expressly prohibit direct and incidental food contact with products containing biocides or biostats. As an example, products containing biocides and biostats should not be used for animal holding areas when food stuffs or water may be consumed by an animal that has been in direct contact with the anti-microbial agents.

## ANIMAL CONTACT

Food stuffs, coming in contact with biocides or biostats must be destroyed and may not be consumed. Animals, such as dogs, that are housed directly on the floor will lick their paws and come in direct contact with biocide or bio-stat.

## ODOR ABATEMENT

Odor Abatement: Urine, as an example, is a chemical that increases in odor as it is broken down by bacteria and as the water evaporates.

## CROWN POLYMERS' PRODUCTS

The Silver can be added to CROWN POLYMERS floor and wall systems without negatively affecting the physical or mechanical properties. When used with clear systems the anti-microbial agent may cause a very slight hazing which may or may not be noticeable depending on the application and system of choice.

## INDEPENDENT TESTING

Silver Physical and Chemical Properties, Toxicological and Risk: Report NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)  
See Attachment

## SILVER SAFETY DATA SHEET

See Attachment

## SILVER US PATENT

See Attachment

## MILLIKEN CONTACT INFORMATION

Silver® is trademarked by:  
Milliken & Company  
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## LIMITED WARRANTY

Crown Polymers warrants its products to be free of manufacturing defects and meets all Crown Polymers current published physical properties. Crown Polymers' sole responsibility shall be to replace the portion of any product proved to be defective. There are no other warranties by Crown Polymers of any nature whatsoever expressed or implied, including any warranty of merchantability or fitness for a particular purpose in connection with this product. Crown Polymers shall not be liable for damages of any sort, including remote or consequential damages resulting from any claimed breach of any warranty whether expressed or implied. Crown Polymers shall not be responsible for the use of this product in a manner to infringe on any patent held by others. In addition, no warranty or guarantee pertaining to appearance, color, fading, chalking, staining, shrinkage, peeling, normal wear and tear or improper application by the applicator will be issued. Damage caused by abuse, neglect and lack of proper maintenance, acts of nature and/or physical movement of the substrate or structural defects are also excluded from the limited warranty. Crown Polymers reserves the right to conduct performance tests on any material claimed to be defective prior to any repairs by owner, general contractor, or applicator.

