

SilvaClean® for Hospitality Frequently Asked Questions

Q. What role do textiles play in the spread of infection?

A. Hospitality textiles such as bed linens, duvet covers, towels, robes, cleaning mops, and curtains can become contaminated with pathogens in three ways:

- 1) Microbial shedding from guests and staff personnel within the hospitality venue (hotel, resort, cruise ship, etc.)
- 2) Contact of textiles with humans and other contaminated surfaces during storage and handling
- 3) Contact of textiles with humans and other surfaces within the laundry facility and during transportation
- 4) Improper reprocessing of textiles

The guest represents a primary epicenter of microbial spread with the textiles being the barrier between the guest and the entire hospitality environment. Similarly, housekeeping and other staff can also carry and shed pathogenic microbes onto clothing and other surfaces.

Q. What scientific data exists about textile contamination?

A. Textiles in the hospitality environment become easily contaminated with bacteria, mold and mildew from the environment. A recent publication has demonstrated high viral load shedding in presymptomatic coronavirus patients on sheets, duvet covers, pillow covers, and towels in hotels (Jiang et. al., Detection of Sever Acute Respiratory Syndrome Coronavirus 2 RNA on Surfaces in Quarantine Rooms. Emerging Infectious Diseases., 2020, Volume 26, Number 9). Additionally, other studies have shown that even commercial laundry processes using industrial detergents and high disinfecting temperatures do not completely eliminate the presence of certain pathogens such as norovirus, MRSA and *Clostridoides difficile*.

Q. What is SilvaClean and how does it work?

A. SilvaClean is a smart patented technology platform that is installed at the laundry facility. It infuses textiles with silver ions during the laundry rinse cycle, where they bond with fabrics to residually kill pathogens, mold and mildew, eliminating odors, helping to remove stains and reduce static. The SilvaClean system is a dispensing device enabled by the Internet of Things (IoT) that doses the EPA-approved SilvaClean chemistry onto textiles during the laundry rinse cycle, leaving fabrics with continuous antimicrobial properties even after laundering (e.g. in storage, during handling and in use). SilvaClean chemistry is an EPA-approved Laundry additive for residual activity against post-laundry contamination. Antimicrobial textile treatment for commercial and industrial use on fibers or textiles. When linens are being used, SilvaClean® remaining in linens will reduce levels of *S. aureus* and *C. albicans* by 99.9% after 6 hours of contact; *K. pneumoniae*, Vancomycinresistant *Enterococcus faecalis*, Extended-spectrum beta-lactamase positive *E. coli*, and

A. baumannii by 99.9% after 3 hours of contact; and Methicillin-Resistant *S. aureus* by 99.9% after 9 hours of contact. As part of a diligent infection control program, experts recommend that hospitality programs should seek to reduce or eliminate exposure to pathogens to the greatest extent possible. One practical, inexpensive way to aid in this effort is to use SilvaClean laundry additive.

Q. Can SilvaClean be used on all textiles?

A. SilvaClean is safe for use on all fabric colors and easily applied to a wide range of textiles, including blankets, robes, towels, pillowcases, table linens, mops, curtains, uniforms, and PPE.

Q. What is the impact of SilvaClean treatment on textiles?

A. It is widely accepted that textiles are fomites capable of harboring microorganisms for extended periods of time. This occurrence results in two potential outcomes that SilvaClean has a direct impact on:

i. *Spread of microorganisms from this source to other surfaces.* These microorganisms, when pathogenic or infectious in nature, can potentially cause community acquired infections). As a critical measure to close the gap around hygiene and cleanliness protocol, SilvaClean aids in controlling environmental sources of microbial contamination.

ii. *Deterioration of fabric over time due to metabolic activities of the microorganisms.* SilvaClean reduces the amount of stain- and odor-causing bacteria, mold and mildew on the fabrics, protecting them and extending the life of use. And, adding silver ions with a positive charge to fabrics reduces the potential for static.

Q. What are the benefits for using SilvaClean in the hospitality industry?

A. In addition to killing and providing constant protection against harmful pathogens, SilvaClean improves the hygiene of your textiles in their environment. As a natural antimicrobial, SilvaClean is a sustainable, green technology. And, by effectively eliminating odors, it keeps your guest rooms smelling clean. SilvaClean also reduces static, eliminating the need for dryer sheets. In addition, SilvaClean is color-safe for textiles and has been proven to extend the life of fabrics.

Q. How is SilvaClean product registered and/or approved for use by the government?

A. SilvaClean is an antimicrobial laundry additive with residual activity that reduces post-laundry contamination. SilvaClean product registration falls under the regulatory authority of the Environmental Protection Agency (EPA), specifically, the Antimicrobials Division (7510P) under the Office of Pesticide Programs (OPP). EPA regulates pesticides under the statutory authority of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), which defines an Antimicrobial pesticide as that which is intended to disinfect, sanitize, reduce, or mitigate growth of development of microorganisms; or protect inanimate objects from contamination caused by microorganisms.

Read more at the EPA website here: <https://www.epa.gov/pesticides/antimicrobial-pesticides>

Q. Is SilvaClean registered with the EPA for public health uses?

A. Yes. Under the product registration “Laundry additive for residual activity against post-laundry contamination.”, the EPA has approved SilvaClean for public health uses.

See approved EPA label on the EPA’s Website:

https://www3.epa.gov/pesticides/chem_search/ppls/090335-00001-20190308.pdf

Q. Is SilvaClean registered with the EPA for non-public health uses?

A. Yes. Under the product registration “treated article exemption”, the EPA has also approved SilvaClean for use in protection of treated textiles from stain- and odor- causing bacteria and fungi (mold and mildew).

See approved EPA label on the EPA’s Website:

https://www3.epa.gov/pesticides/chem_search/ppls/090335-00001-20190308.pdf

Q. What is the return on investment in the hospitality industry?

A. Textiles treated with SilvaClean provide residual control of pathogens, meaning the textiles are self-cleaning. Paired with a hard-surface program, this holistic approach allows rooms to be turned over promptly. In addition, with overall less laundering required, the hospitality industry will save on other costs, such as labor and water.

Q. Is there a risk of allergic reactions to SilvaClean?

A. SilvaClean utilizes pure silver and there are no known allergic reactions to silver in this form. Perceived silver allergies such as those to sterling silver jewelry are actually reactions to other elements in the silver-based alloy, most commonly nickel.

Q. What studies support the use of SilvaClean in an Infection and Hygiene Control program?

A. EPA approved the public health claims for SilvaClean based on third party Good Laboratory Practice (GLP) data demonstrating the following kill times:

Microorganism	Hours of Contact	Textile
<i>Staphylococcus aureus</i>	6 hours	Cotton, cotton/polyester blend, or microfiber
<i>Klebsiella pneumoniae</i>	3 hours	
<i>Vancomycin-resistant Enterococcus faecalis (VRE)</i>	3 hours	
<i>Extended-spectrum beta-lactamase (ESBL) positive</i>	3 hours	Cotton
<i>Acinetobacter baumannii</i>	3 hours	or
<i>Candida albicans (yeast)</i>	6 hours	cotton/polyester blend
<i>Methicillin-Resistant Staphylococcus aureus (MRSA)</i>	9 hours	

These data were supported by multi-year clinical studies in collaboration with a Stanford University scientist confirming that textiles are routinely re-contaminated with microbes during storage, handling, and use, even after undergoing a certified hygienically clean laundry process. The study further demonstrated that by regularly laundering those textiles with SilvaClean, microbes, including *Staphylococcus* were significantly reduced before, during, and after patient use.

At an independent hospital study, microbial bioburden was evaluated pre- and post-SilvaClean treatment at four points in the laundry-hospital linen route including two in the laundry and two in the hospital. These studies also demonstrated a reduction in overall microbial bioburden in treated linens and curtains. Notably, a significant reduction of 99% was observed even in linen samples that were relatively clean and were sampled straight out of the dryer.

Recently, extensive studies have provided technical data that shows SilvaClean’s ionic silver is effective at controlling SARS-CoV-2 and norovirus.

Click here to review our clinical studies: <http://www.appliedsilver.com/resources>.

Q. Does SilvaClean change the way fabric looks or feels?

A. SilvaClean antimicrobial treatment does not change the way fabric looks, nor does it change the way it feels, and will improve the cleanliness of the fabric and reduce any odor attributed to microorganisms. In fact, it is impossible to tell that SilvaClean is present with the naked eye, so Applied Silver has created a SilvaSure® test kit to detect for the presence of SilvaClean.

Q. What are the potential environmental impacts of SilvaClean treatment?

A. The SilvaClean product is registered for use as a laundry additive by the Federal EPA and the California Department of Pesticide Registration for industrial use. SilvaClean has been intensively tested for concentration of silver in effluents as part of that approval process. Any residual silver ions in the wastewater are at levels significantly below the EPA's and the city Publicly Owned Treatment Works (POTW) requirements.

Q. What type of antimicrobial is SilvaClean?

A. SilvaClean employs silver ions that provide a complete killing mechanism against bacteria. Silver ions in SilvaClean have a three-way kill mechanism:

- 1) Cell Lysis: Silver ions bind to the cell wall of the microbe, causing it to rupture.
- 2) Cell suffocation: Once inside the cell, silver ions attach to the metabolic enzymes, suffocating the Cells.
- 3) Stops DNA replication: The silver ions bind to the strands of DNA to stop the replication process. In contrast, the action of traditional laundry detergents is generally limited to a single mode of action such as microbial cell lysis, that can be inefficient and cause some microbes to survive and multiply. A recent study has shown that commercial laundry processes using industrial detergents and high disinfecting temperatures do not completely eliminate the presence of bacteria such as *Clostridium difficile* (Tarrant et. al., Infect. Control & Hosp. Epidemiol., 2018, 0, 1-6).
- 4) Its antiviral effects are dependent on its ability to inactivate key proteins involved in keeping the integrity of viruses.

Q. Is SilvaClean compatible with all laundry formulas?

A. Yes. SilvaClean is compatible with all brands of detergent, bleach, sour, softeners, breaks, etc. SilvaClean treatment does not change the way the fabric looks or feels. Silver ions are much smaller than the eye can see and cannot be seen on textiles and do not result in any discoloration of the treated textile. SilvaClean antimicrobial technology is designed for industrial water (i.e. softened water) but works efficiently with varying water profiles.

Q. Is SilvaClean® made from Nano silver?

A. No, SilvaClean is a non-nanoscale silver ion-based laundry additive product. It is made up of silver ions, which should not be confused with nano-silver. Silver ions are what gives silver its antimicrobial properties. Ionic silver is easily measured and its delivery via the SilvaClean dosing system that is tightly controlled by IoT. Nano-silver must shed silver ions to exhibit antimicrobial properties, and the rate of this release is hard to predict because it varies with the environmental variables (moisture, pressure, heat, etc.). The EPA has begun to revoke products with nano-silver as they pose potential environmental risks.

Q. What's the difference between SilvaClean and other Bactericides/Fungicides?

A. Unlike chlorine, quaternary ammonium compounds (quats.) and peroxide additives, the SilvaClean, when treated onto fabrics, is effective when the fabrics are used. When linens are being used, SilvaClean® remaining in linens will reduce levels of *S. aureus* and *C. albicans* by 99.9% after 6 hours of contact; *K. pneumoniae*, Vancomycin-resistant *Enterococcus faecalis*, Extended-spectrum beta-lactamase positive *E. coli*, and *A. baumannii* by 99.9% after 3 hours of contact; and Methicillin-Resistant *S. aureus* by 99.9% after 9 hours of contact.

Q. How does SilvaClean compare to other antimicrobial textiles?

A. Antimicrobial textiles typically have silver or copper threads woven into the textile. This presents multiple disadvantages:

- i) **High cost of implementation:** New inventory is required to be purchased, with average threaded linen cost being up to 2-3X higher than standard linen. Additionally, maintenance cost is also high. Copper/silver threaded linens are efficacious for only a limited number of uses after which a loss of efficacy is observed (e.g. 30 laundry cycles) and the linens have to be routinely replaced. Special inventory will also have to be purchased to replace lost linens. SilvaClean can be applied to all existing linen inventory, and re-applied each time the linen is laundered, making it a cost-effective solution that is easy to implement.
- ii) **Reduced efficiency:** For threaded antimicrobial textiles to work efficiently, microbes are required to come in contact with the silver ions as they are released from the threads. This process requires moisture and is uncontrolled, making the antimicrobial killing action less efficient. In contrast, SilvaClean is delivered as pure ionic silver onto textiles, and is active under wet or dry conditions and provides a highly efficient killing action against microbes.
- iii) **Loss of efficacy over time:** The re-laundering process of threaded textiles results in a loss of the metal threads over time, resulting in a reduction in efficacy. In contrast, SilvaClean is applied during each re-laundering step, efficacy levels are always consistently maintained.
- iv) **Discoloration:** Copper-threaded textiles in particular undergo visible discoloration with repeated washes. The rate of discoloration varies with individual pieces of linens.

Q. How long does SilvaClean last?

A. SilvaClean is laundry additive to reduce post-laundry contamination with residual antimicrobial activity. SilvaClean is stable in fabric and has shown efficacy in real-time stability studies over 4 years. When the fabric is re-laundered, it gets replenished with a fresh treatment of SilvaClean so you never have to worry about the textile remaining persistent. SilvaClean is not a substitute for any existing component of a diligent Infection Control program, standard textile change-out protocols should be followed.