Microbial Control

SILVADUR™ ET Antimicrobial

EPA Reg. No. 707-313

General

SILVADUR™ ET Antimicrobial is a silver-based antimicrobial that uses a patented delivery system to transport and secure the silver to a treated article. This novel system controls the release of the silver to avoid discoloration and early silver exhaustion typical of silver systems. When incorporated into industrial and household materials during the manufacturing process, SILVADUR ET inhibits the growth of microbes to offer protection, durability and freshness.

It is supplied in liquid form, making it easy to dispense and mix, and is compatible with a wide range of chemicals, including latex resins (like PVA, SBR, EVA) and finishing agents (like anti-wrinkle resins, fluorocarbons and softeners).

Physical Properties

The following are typical properties of SILVADUR ET Antimicrobial; **they are not to be considered product specifications.**

Appearance, visual:	Clear, yellow to light amber liquid, free of particulate matter
Solids content, wt. %:	25 – 28
pH:	10.2 – 11.2
Viscosity[1], cps:	150 max
Silver concentration via titration, wt. %:	2.6 – 3.1
Gardner color:	<12
Turbidity (NTU):	<200
Flash point, °C, Closed Cup:	+16

[1]Viscometer Brookfield Model DV-II + LV spindle 1 , speed 30 rpm

Special Features and Benefits

- Smart control: controlled release of silver for improved durability
- Improved durability: longer-term efficacy and improved cost-to-treat
- Novel liquid formulation: a clear and non-tacky solution that is easy to dilute, dose, formulate and apply
- Broad spectrum activity: controls various odor-causing microorganisms
- Color stability: improved product quality and appearance vs. competitive silver products
- Thermal stability: high tolerance in manufacturing
- Easy to coat natural and synthetic fibers
- Compatible with a broad range of woven and non-woven additives, including fluorocarbon chemicals, softeners, antiwrinkle resins, etc.
- Maintains aesthetics of the fabric
- Can be applied by both pad and exhaustion process

Antimicrobial Activity

SILVADUR™ ET Antimicrobial has been tested for efficacy against a variety of bacteria and fungi organisms. Please note that approval of this product by United States Environmental Protection Agency limits efficacy claims made for SILVADUR ET Antimicrobial to non-pathogenic organisms.

SILVADUR ET Antimicrobial is effective at controlling and eradicating a number of microorganisms, including, but not limited to:

Bacteria	Molds
Escherichia coli	*Aspergillus niger*
Klebsiella pneumoniae	*Trycophyton mentagrophytes*
Pseudomonas aeruginosa	
Staphylococcus aureus	
Corneybacterium ammoniagenes	

The effectiveness of SILVADUR ET Antimicrobial against microorganisms is related to the dosage level applied to the article.

Efficacy on 100% Cotton Woven

	AATCC Method 100 Log Reduction CFU/mL after 24 hr Contact Time		
Silver content, ppm on fabric	*Staphylococcus aureus*	*Klebsiella pneumoniae*	Performance
0	-1.0	-1.2	Microbial growth
75	1.0	0.7	Growth is inhibited
100	2.5	2.2	Odor control
300	>4.7	>4.4	Excellent antimicrobial protection + odor control

Efficacy on 100% Pet Non-woven

	AATCC Method 100 Log Reduction CFU/mL after 24 hr Contact Time		
Silver content, ppm on fabric	*Staphylococcus aureus*	*Klebsiella pneumoniae*	Performance
0	-0.6	-1.6	Microbial growth
75	1.4	1.0	Growth is inhibited
100	2.7	2.4	Odor control
300	>4.4	>4.4	Excellent antimicrobial protection + odor control

Efficacy and Durability with Finishing Chemicals on 100% Cotton Woven

	Wash Cycles[1]	Silver content, ppm on fabric	% Retained	AATCC Method 100 Log Reduction CFU/mL after 24 hr Contact Time		Performance
				Staphylococcus aureus	*Klebsiella pneumoniae*	
No Treatment	0	0	N/A	-0.8	-1.3	Microbial growth
	2	0	N/A	-1.5	-0.6	Microbial growth
	4	0	N/A	-1.2	-0.8	Microbial growth
	10	0	N/A	-1.2	-1.0	Microbial growth
SILVADUR™ ET + Antiwrinkle Resin	0	302	100	4.2	4.4	Excellent antimicrobial protection + odor control
	2	190	63	4.2	4.4	Excellent antimicrobial protection + odor control
	4	175	58	3.8	4.4	Excellent antimicrobial protection + odor control
	10	139	46	3.8	4.4	Excellent antimicrobial protection + odor control

[1]AATCC Method 61 Type No. 2A – one cycle simulates 5 home launderings

Color Contribution 100% White Cotton

Silver content, ppm on fabric	Exposure Cycle[1]	UV Stability Measured as Lab Hunter Values	Performance
0	0	92.50, +1.46, -4.63	The "control" fabric in white develops slight yellowness, when exposed to UV, even without any treatment
	1	92.98, +0.95, -2.48	
	2	92.77, +0.77, -2.31	
	3	92.81, +0.78, -1.48	
100	0	92.36, +1.42, -4.24	SILVADUR ET treated fabric has an imperceptible color shift but no black or red color characteristic of other silver systems
	1	92.41, +1.05, -2.01	
	2	91.09, +1.23, -1.02	
	3	90.44, +1.41, -0.20	
300	0	92.39, +1.40, -4.46	
	4	92.56, +1.16, -1.77	
	10	91.11, +1.40, -0.50	
		90.48, +1.75, +0.21	

[1]Cycle = 4 hr light @ 55°C + 2 hr condensation @ 45°C using QUV equipped with UVA 340 bulbs at 1W/m^2/nm

Applications/ Directions for Use

SILVADUR™ ET may be applied to both organic and inorganic surfaces using standard coating methods such as saturation, spray, foam, printing or exhaust. Approved applications for SILVADUR ET are the preservation of non-food contact coatings and films, and industrial and household woven and nonwoven fibers. From mattresses and linens, to sports apparel and footwear, to fabrics used in hygienic environments, SILVADUR ET is an ideal solution.

For use in coatings and films: non-food contact uses in industrial and household products such as, water-based paints and coatings for paper and wood coatings, paints used for architectural product finishes, and special-purpose coatings. Use SILVADUR ET at a rate of 0.24% to 4.92% (70 to 1450 ppm active ingredient).

For use in fibers: non-food contact uses in industrial and household woven and non-woven fibers such as bedding, apparel, footwear, wall and floor coverings, carpets, draperies, wiping cloths, brushes, filters, insulation, tents, awnings and tarps. Use SILVADUR ET in the treatment bath to provide 0.0015% to 0.5% (15 to 5000 ppm) silver on the fiber.

Use SILVADUR ET in a well ventilated area, free of sparks and open flames. Standard city water may be used, provided it is free of high concentrations of metal ions. After adding SILVADUR ET Antimicrobial adjust the bath pH to between 5 and 6 with acetic acid. If the application requires a large amount of SILVADUR ET Antimicrobial (e.g. > 1%) a higher pH (9-11) will be required.

Treatment bath concentrations: charge the appropriate quantity of SILVADUR ET Antimicrobial based on the final desired treatment level and the wet pick-up of the article to be treated, e.g., a desired final treatment level of 100 ppm Ag(I) on an article having a measured wet pick-up of 200% would require a bath concentration of 50 ppm silver (i.e., 0.17% SILVADUR ET Antimicrobial).

Storage, Handling and Disposal

Please refer to the Safety Data Sheet for this product for precise instructions. The processing and use of industrial chemicals requires adequate technical and professional knowledge. In general, avoid eye and skin contact, and wear correct personal protective equipment. Avoid prolonged inhalation of SILVADUR ET Antimicrobial vapors.

Store and use the SILVADUR ET Antimicrobial in a well ventilated area, away from sparks or open flames. It should be stored at ambient conditions in the original container, tightly sealed. Protect from frost and heat.

Product Stewardship

Dow Microbial Control encourages its customers to review their applications of Dow Microbial Control products from the standpoint of human health and environmental quality. To help ensure that Dow Microbial Control products are not used in ways for which they are not intended or tested, Dow Microbial Control personnel are willing to assist customers in dealing with ecological and product safety considerations. Contact your representative if you need any assistance or information. When considering the use of any Dow product in a particular application, review the latest Safety Data Sheet and country-specific product label to ensure the intended use is within the scope of approved uses and can be accomplished safely. Before handling any of the products mentioned in the text, obtain available product safety information and take necessary steps to ensure safety of use.

For further information visit our website:
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†except Indonesia and Vietnam

USE BIOCIDES SAFELY. ALWAYS READ THE LABEL AND PRODUCT INFORMATION BEFORE USE.