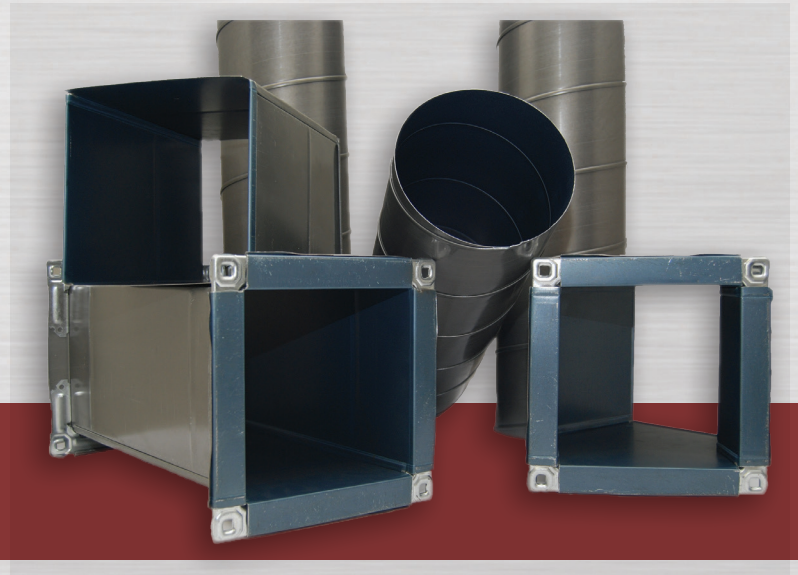


Field to Factory Direct Communication

*Manufacturing and Supplying Sheet Metal Duct
and HVAC Products since 2004*



Agion® Antimicrobial

What is Agion® Anti-Microbial:

Agion® Anti-Microbial is an epoxy coating that contains silver ions. These silver ions suppress any microbial or bacterial growth on the inside of the duct. Unlike chemical-based coatings that dissipate over a period of time, elemental silver maintains its effectiveness over many years.

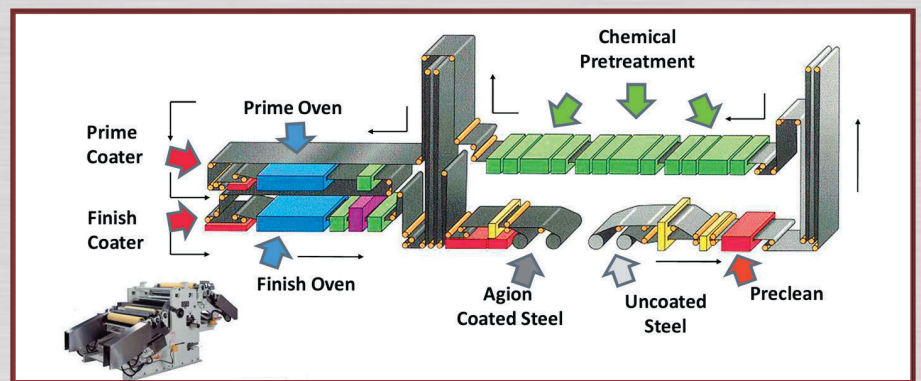


Figure 1 displays the production process of Agion®

How it works:

Once Agion® coated HVAC duct is installed, anytime microbes land on the coated surface, an ionic exchange occurs therefore suppressing possible growth.

Agion® Anti-Microbial vs. Stainless Steel

- Able to withstand some staining whereas stainless is affected (based on laboratory data).
- Milder than stainless and easier on shop equipment
- More economical than stainless steel
- Domestically produced, much of stainless used today is imported from overseas
- Suppresses the growth of molds, mildews, and microbes whereas stainless allows microbial growth

Applications:

Laboratories, Clean Rooms, Pharmaceuticals, Institutions, Food Processing Plants, Health Care

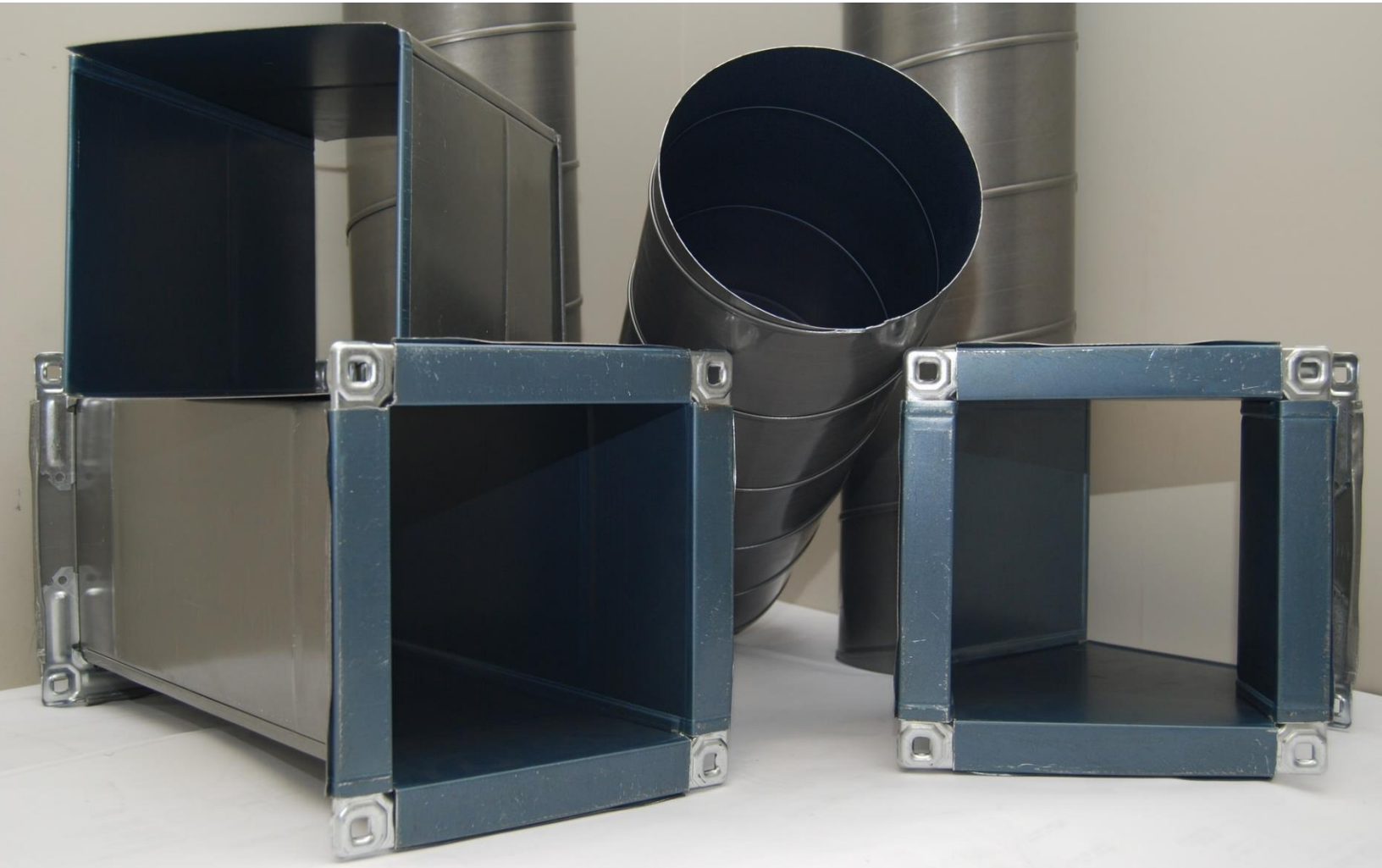
AGION® ANTIMICROBIAL-TREATED STEEL PAINT SPECIFICATION

CHARACTERISTIC	COIL-COATED PAINT SYSTEM
Coating type	Solvent-based epoxy
Surface preparation	None
Coating application	Roll-coating technology at coil-coating facility
Coating thickness	0.1 to 0.2 mils (uniform)
Coating cure time	None
Coating hardness	2H min
Temperature limits	0 to 350°F
Coating VOC off-gassing	Negligible
Flame and smoke spread UL Standard 723 (ASTM E84)	Essentially zero
Agency approvals	EPA, FDA, NFS (Agion® compound)



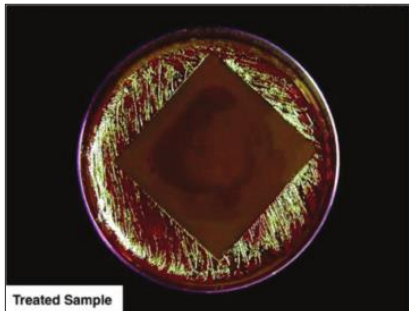
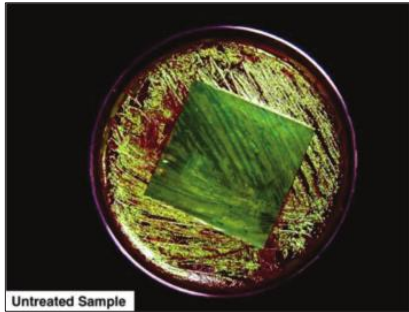
Field to Factory Direct Communication

Manufacturing and Supplying Sheet Metal Duct
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**Antimicrobial
Coated Duct**

Antimicrobial Coated Duct



The photos above display the significant bacteria reduction on an untreated sample vs a treated sample

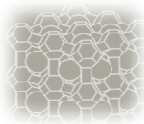
Silver has been utilized for thousands of years from chalices and eating utensils to current electronics and medical instruments. The element was and is so widely used because of its natural antimicrobial properties. Without harmful toxins, silver has the ability to effectively suppress the growth of mold and bacteria. Due to these qualities, an epoxy coating was created with infused silver ions and is applied to the surface of sheet metal duct products.

Utilizing silver in the epoxy coating provides microbial and mold suppression, without the use of adverse chemicals. A surface protected with this elemental antimicrobial epoxy will also resist corrosion and staining. The use of the silver-based epoxy on metal products has gained popularity and is utilized in the manufacturing of HVAC duct, mechanical unit cabinets, panels, and many medical surfaces. When clean surfaces are essential in industries such as food processing, medical, and laboratory, silver-based epoxy coated products are extremely beneficial.

In HVAC systems, ductwork manufactured with this elemental antimicrobial coated metal will reduce concerns of bacteria growth and corrosion within the air stream of the duct. The silver ions in this epoxy will attract sodium ions which are found in the moisture carrying bacteria through the air stream. Once in range, the silver ions will act as a captive barrier which suppresses the sodium ions movements. This silver technology will only activate when moisture is detected, and conditions are ideal for bacterial growth. This functionality is efficient and equates to long-lasting performance.

This silver-based epoxy is a great alternative to stainless steel in mild applications and environments. In the HVAC industry, stainless steel is utilized for its unique characteristics. Stainless has the ability to resist corrosion, rust, and stains for “clean” purposes. However, stainless steel is neither completely corrosion resistant nor stain proof. Galvanized metal coated with this silver-based epoxy offers higher values of corrosion and stain resistance. A recent 10 – year analysis of the application of epoxy coating with silver ions proved its benefits over the use of unprotected stainless steel. After 5 years of the application, there was no change in efficacy or performance and resulted in the reduction of bacterial growth. After 10 years, efficacy was still unchanged and there were no measurable micro-organism levels detected in 30 of 31 swabbed areas. As much as 50% cheaper than stainless steel and with the added benefits of corrosion resistance and bacterial growth reduction, epoxy coating with antimicrobial elements is a great alternative to stainless steel both economically and efficiently.

Much of this product's efficacy can be attributed to the application process. This silver-based epoxy is most commonly applied to the surface of G90 steel in a controlled production environment. Before the epoxy is baked on at four hundred degrees Fahrenheit, the substrate is first cleaned and pre-treated to remove any previous imperfections. Once cleaned, the epoxy is roll applied to guarantee consistencies of the coating thickness. The uniformity of this coating process allows manufacturers to utilize the material in various production methods without worry of delamination or crazing.

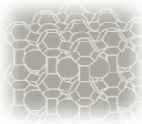


Agion Antimicrobial

- Extensive testing proves that the Agion Antimicrobial is safe to use for all applications.
- Safety tests include:
 - Oral toxicity
 - Percutaneous toxicity
 - Primary skin irritation
 - Mutagenicity
 - Carcinogenicity
 - Chronic toxicity (2 year)
 - Complete ISO 10993-1 biocompatibility tests required of a permanent medical implant

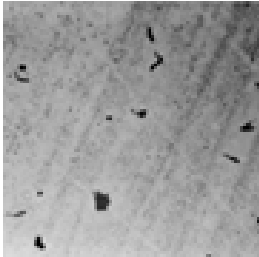


SAFETY | QUALITY | PRODUCTIVITY



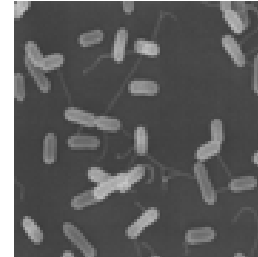
Effectiveness

Agion Tested With These Bacteria



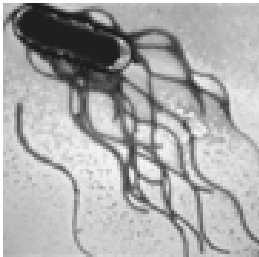
Campylobacter Jejuni

Most common cause of diarrhea;
Sources: raw and undercooked meat and poultry, raw milk and untreated water



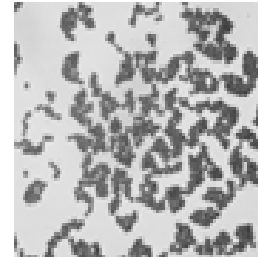
Listeria Monocytogenes

Causes listeriosis, a serious disease for pregnant women, newborns and adults with a weakened immune system;
Sources: soil and water. It has been found in dairy products including soft cheeses as well as in raw and undercooked meat, in poultry and seafood, and in produce



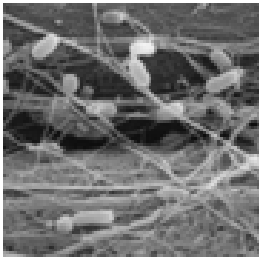
Salmonella

Second most common cause of foodborne illness.
Sources: raw and undercooked eggs, undercooked poultry and meat, dairy products, seafood, fruits and vegetables



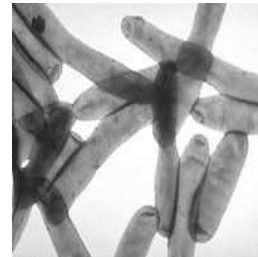
Staphylococcus Aureus

This bacterium produces a toxin that causes vomiting shortly after ingesting;
Sources: cooked foods high in protein (e.g. cooked ham, salads, bakery products, dairy products)



E. Coli O157:H7

A bacterium that can produce a deadly toxin;
Sources: meat, especially undercooked or raw hamburger, produce and raw milk



Legionella Pneumophila

Causes Legionnaires disease;
Sources: Airborne via respiratory droplets

SAFETY | QUALITY | PRODUCTIVITY



Agion Antimicrobial Efficacy Against Coronavirus is Tested and Published

The technology is deployed in the EU, Canada and United States in FDA cleared N95 respirator

February 10, 2020

The novel coronavirus (nCoV) outbreak in China has prompted several inquiries to Sciessent regarding the ability of Agion Antimicrobial to inactivate viruses. This white paper summarizes some university and government research previously completed on the antiviral properties of Agion.

Initial Research

The first half of the 2000's was marked by viral outbreaks that included H5N1 avian influenza, norovirus on cruise ships and the SARS coronavirus. Sciessent (formerly Agion Technologies) engaged with university researchers, industry partners and government organizations to investigate the ability of Agion to inactivate viruses. At the time the Chinese Center for Disease Control was looking for approaches to control the coronavirus and evaluated the Agion powder for efficacy. Around the same time Sciessent began working with Prof. Charles Gerba at the University of Arizona and to evaluate antiviral properties of Agion.

A Note on Terminology

Viruses are not living organisms; they must enter a living cell to multiply. Therefore, antiviral agents are said to "inactivate" viruses, not "kill" them.

Test Results

Chinese CDC (2003)

- Complete inactivation of SARS coronavirus in 2 hours
- *VERO E6 cell substrate, using virus CPE method*

University of Arizona (2004)

- 90% reduction of human coronavirus 229E in 1 hour
- 99% reduction of human coronavirus 229E in 2 hours
- 99.999% reduction of human coronavirus 229E in 24 hours
- *TCID50 technique, monitoring MRC-5 cell monolayers for cytopathic effects*

Chinese Academy of Agricultural Sciences (2006)

- 99% reduction of H5N1 avian influenza in 10 minutes
- *Klein-Defors suspension eradication test*

Published Research

A portion of the above results were published by Professor Gerba and his team in the peer-reviewed scientific journal *Food and Environmental Virology*:

[Assessment of the Antiviral Properties of Zeolites Containing Metal Ions,](#)
[Food Environ Virol \(2009\) 1:37–41](#)

Abstract

The antiviral properties of zeolite (sodium aluminosilicate) powders amended with metal ions were assessed using human coronavirus 229E, feline infectious peritonitis virus (FIPV), and feline calicivirus F-9. Zeolites containing silver and silver/copper caused significant reductions of coronavirus 229E after 1 h in suspension. The silver/copper combination yielded a $>5.13\text{-log}_{10}$ reduction within 24 h. It was also the most effective ($>3.18\text{-log}_{10}$) against FIPV after 4 h. Other formulations were ineffective against FIPV. On plastic coupons with incorporated silver/copper-zeolites, $>1.7\text{-log}_{10}$ and $>3.8\text{-log}_{10}$ reductions were achieved for coronavirus 229E and feline calicivirus within 24 h, respectively. Silver/copper zeolite reduced titers of all viruses tested, suggesting that it may be effective against related pathogens of interest [i.e., SARS coronavirus, other coronaviruses, human norovirus (calicivirus)]. Of note, it was effective against both enveloped and nonenveloped viruses. Metal-zeolites could therefore possibly be used in applications to reduce virus contamination of fomites and thus the spread of viral diseases.

Note: Springer Nature is making Coronavirus research free, including the above article.

Agion in Polyester Fiber

During this time Sciesent worked with Foss Manufacturing (now Foss Performance Materials) to develop a polyester fiber with Agion embedded into the fiber itself. The fiber, named Fosshield, was incorporated into N95 respirator media as an approach to limit contamination of the respirator by the wearer or those around them. Further antiviral efficacy testing was performed on the respirator media construction.

N95 Respirator Media Test Results

- 99.98% reduction of coronavirus in 4 hours*
- 99.6% reduction of adenovirus in 1 hour*
- 99.999% reduction of haemophilus influenzae in 1 hour*
- 99.8% reduction of feline calicivirus (norovirus surrogate) in 4 hours*

**Results based on testing of samples containing Agion Antimicrobial*

Once proven, the media was manufactured by Nexera Medical into an N95 respirator, which underwent extensive testing and was submitted to the FDA in 2009. The Nexera Spectrashield surgical respirator was cleared by NIOSH and received a 510(k) from the Food and Drug Administration in 2011 and has since been cleared in Canada and the European Union.

Approved claims for the European Union:

http://www.nexeramed.com/nfiles/news_110711_1.php

Approved claims for Canada:

<http://www.nexeramed.com/cfiles/regulatory.php?region=CA>

Application Options

Agion is a versatile material that can be mixed into coatings, compounded into plastics, and applied to textiles using several processes:

Topical – Fastest and most versatile

- Pad/Dry/Cure
- Exhaust
- Dip/Extract
- Yarn Package

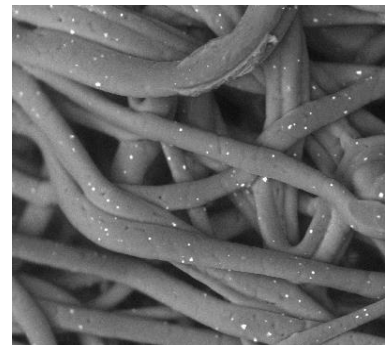
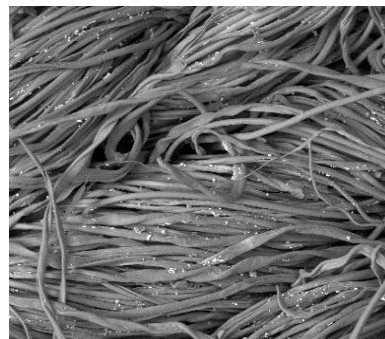
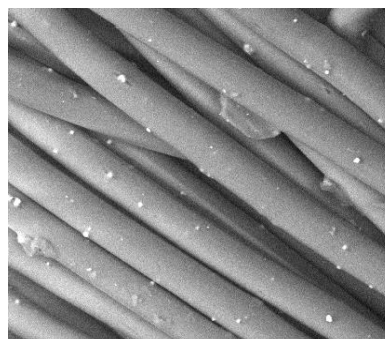
Embedded

- Filament or staple fiber spinning
- Melt blown nonwoven
- Spunbond nonwoven

Contacts

Sciessent: info@sciessent.com

Fosshield: <http://www.fosspm.com/technology/fosshield.php>



The Agion® Antimicrobial is presently registered by the United States Environmental Protection Agency as a preservative and bacteriostatic agent for use in treated articles under 40 CFR 152.25a. The information presented herein is not intended to support or endorse public health claims for treated articles. The Agion Antimicrobial is also used in medical devices under the Food and Drug Administration in the US; those medical device claims are based on safety and efficacy testing and are limited to those approved by FDA. In the EU, the Agion Antimicrobial is used in medical devices under the Medical Device Directive: those medical device claims are based on safety and efficacy testing and are limited to those approved by the designated Competent Authorities and/or Notified Bodies