



Copper Mesh Seating & Its Benefits in Healthcare

Combining technological advances in and a people-first approach to seating in the clinical environments of today



Today, there is a need to design and promote a holistic standard for seating that meets the ergonomic requirements for caregivers and employees in Healthcare facilities, while also meeting the need for infectious disease control areas. When healthcare facilities create work environments that support multidisciplinary tasks from patient care to the administration required to support that care, the need to address suitable seating solutions that can cross into those specific task areas arises.



Compromising the decision on seating by favoring people over environment or visa-versa is not an option.

Ergonomic programs have long been in place, encouraging physical health and behavioral awareness with an emphasis on musculoskeletal injury prevention, increased productivity and efficiency for employees at work. Separate from ergonomic considerations, sustainability initiatives have addressed physical health by minimizing exposure risks to harmful chemicals and materials through standards such as LEED and BIFMA LEVEL® certifications. However, these disparate programs fail to address a complete sense of the persons needs, while encompassing the stringent requirements for infectious disease control areas.

Productivity used to be the ultimate goal for earlier generations of office workers in administration areas. High performance seating with heavy duty characteristics was most important for 24/7 usage areas along with meeting the requirements for infectious disease control i.e. bleach cleanable and antimicrobial. However, having one series of seating that could meet both requirements in a mesh back solution was never seen to be an option.

With today's advancements in technology and design there is an opportunity to meet both needs. The purpose of this paper is to outline this solution; via seating Genie Copper Mesh®.

The Environment: Current status of healthcare seating requirements for clinical areas.

The majority of healthcare facilities in the US require that products being used in clinical areas i.e. near patient environment, must meet the requirements for infectious disease control i.e. products that can control or prevent infections and the spread of disease. Manufacturers of seating and textile manufacturers who supply those seating factories are responding to these requirements by increasingly incorporating antibacterial or antimicrobial chemicals into health-care seating solutions. However, there is a high degree of skepticism among healthcare designers/specifiers of furniture as it relates to the effectiveness of these antimicrobial textiles and the additional cost burden it presents to healthcare clients.

In a recent public positioning statement by Kaiser Permanente, they researched the impact of using antimicrobial solutions.

Herein follows a summary of their statement:

Kaiser Antimicrobial Position Statement:
National Environmental Health & Safety collaborated with the National Infection Prevention and Control Steering Committee to develop a position paper to inform healthcare facilities of the usefulness of these finishes and textiles.

The assessment; microorganisms transferred onto a surface may die, survive, or multiply. Most gram-positive bacteria, such as *Enterococcus* spp. (including VRE), *Staphylococcus aureus* (including MRSA), or *Streptococcus pyogenes*, survive for months on dry surfaces. Many gram-negative species e.g. *Acinetobacter* spp., *Escherichia coli*, *Klebsiella* spp. can also survive for months. Most viruses from the respiratory tract, such as corona, coxsackie, influenzas, SARS or rhino virus, can persist on surfaces for a few days...therefore, routine comprehensive cleaning and disinfection (with friction) of surfaces is required to remove the majority of pathogens of concern from environmental surfaces in the near patient environment (i.e. surfaces that can be touched frequently by patient and/or healthcare worker).

It is proposed, mainly by manufacturers of antimicrobial textiles, that the presence of easy to clean surfaces coupled with additional antimicrobial properties may

help reduce the transfer of microorganisms. The majority of the microorganisms exist attached to surfaces. If they are able to grow on these surfaces, they then form layers of growth known as biofilms.

Biofilms are most common at solid-liquid interfaces e.g. water pipes, tooth surface or catheters, where the liquid flows over the surface bringing nutrients to the biofilm, removing waste products and transporting parts of the biofilm away from it to other potential surfaces where contamination can occur. If this happens, it can result in stains, odor and accumulation of dirt, which can increase transmission risk. Therefore, the impregnation of an antimicrobial agent throughout a surface is proposed to be advantageous in reducing this risk. This risk is further reduced with appropriate hand hygiene performed by patients, healthcare workers and physicians.

At the end of their research, Kaiser stated "At this time due to the increased cost and absence of randomized controlled trials showing direct impact of patient infection rates, we do not support general use of these antimicrobial products in Kaiser Permanente".

This caused manufacturers to perk up and listen to the needs being expressed. via seating took this listening to another level and sought to better understand the environment in question.

The People: the role of nurses and their exposure to health risk factors.

When we examine the role of nurses / care givers in the clinical environment; In general, a registered nurse job description includes monitoring, recording and reporting symptoms or changes in patient's conditions. Also, they are tasked with maintaining accurate patients' reports and medical histories, administering medication and treatment to patients and observing reactions or side effects.

Registered nurses also, perform diagnostic tests, supervise less skilled licensed or certified nurses, prepare patients for examination and treatment. Finally, they advise patients and their families on various health conditions and any other duty that may be included in a registered nurse job description.

With the majority of the focus of the nurse being the responsibility of patient care, the last thing they are thinking of is their own health and welfare. Nurses confront a myriad of potential health impacts as a result of their career choice; exposure to infectious diseases, toxic substances, back injuries and radiation. They are also subject to hazards such as stress, excessive shift work, and patient retaliation/violence. These typically fall under the broad

categories of chemical, biological, physical and psychosocial hazards.

Top 5 most dangerous things about being a nurse – source Edgar Snyder & Associates – a personal injury law firm representing nurses.

1. **Physical Strain:** nurses experience work-related musculoskeletal disease (MSD) / injuries at a rate of almost seven times the national average. There are over 35,000 back and other musculoskeletal injuries among nursing employees every year and many of these are severe enough to result in missed work days.
2. **Chronic Overtime:** Since nurses provide such vital care to patients, hospitals cannot afford to leave floors understaffed if an employee suddenly calls off. Although there are regulations in some states relating to this, administrators still regularly ask nurses to voluntarily work hours in addition to their scheduled hours.
3. **Working night shifts:** Nurses don't always follow the typical 9 to 5 schedule, and many are driving home from the night-shift when the rest of the world is just leaving for work in the morning. Fatigue combined with driving during twilight hours, when visibility is at its worst, could cause car accidents.
4. **Experiencing workplace violence:** in a 2014 survey three out of four nurses

reported experiencing violence on the job either verbal or physical. Those working in emergency or psychology departments are at higher risk.

5. Exposure to hazardous chemicals.

According to the International Journal of Caring Sciences – Sept 2017 (volume 10/issue 3 / page 1729) - Low back pain (LBP) is the second most common cause for consulting a doctor, the fifth for inpatient treatment and the third among diseases that require a surgery. Occupational risk factors for nurses as it relates to LBP are mainly patient handling, excessive bending, excessive standing and incorrect sitting.

As it relates to how and where nurses work; it can vary from being on wheels: Computers on Wheels (COWs) which have evolved to Workstations on Wheels (WOWs), to small workstation areas where a task chair is positioned.

This task chair needs to:

1. Meet requirements of infectious disease control.
2. Be versatile and user friendly.
3. Be ergonomically appropriate offering support and comfort for extended sitting:
 - a. Offer appropriate back support and lumbar adjustment.
 - b. Adjustments that meet:
 - i. Overall height – seat to floor.
 - ii. Arm height adjustment.
 - iii. Seat depth adjustment.
 - iv. Back lock.
4. Accommodate various body shapes and sizes – typically up to 300 lbs.
5. Carry a warranty to support 24/7 use.
6. Meet aesthetic design criteria.

The consideration of the task chair is important as it is widely accepted that incorrect sitting postures can also lead to LBP. via seating already understood this 'People Aspect' as it has been supplying quality ergonomic seating solutions for over 30 years.

How to meet the needs of the clinical environment and the people in them from the seating perspective.

When considering the technical requirements for the clinical area as outlined in 'The Environment' section of this paper, and also meeting the needs to reduce the exposure to MSDs as it relates to sitting, another aspect of the connection between the two emerged.

In October 2016, Children's Hospital Colorado came to via seating to discuss their task seating requirements. During this conversation, the environment and the people considerations came forth and reinforced the challenges for both (as outlined above). In addition to those, other aspects became highly relevant:

- the additional needs to provide smaller scale / slimline back support for smaller workstation areas
- the benefits of mesh back seating i.e. the desire from the caregivers perspective for a cooler chair back to sit in. This was deemed to be very important from the caregivers perspective as their general duties are highly physical (as outlined) and

require them to move around a lot, therefore their body temperature increases so the opportunity to feel cooler in a mesh back chair presented itself.

Good quality mesh back task seating solutions have long been established as a material that supports the individual from an ergonomic perspective with the added benefits of being more contemporary and slim line in design and having the benefits of delivering a cooler, air pass through effect to the user. However, mesh back task seating has always been frowned upon from the clinical environments stand point in that there is a concern that mesh doesn't offer the benefits of antimicrobial textiles, it isn't typically bleach cleanable and therefore it doesn't meet the needs from an infectious disease control stand point.

How to create a mesh back task seating solution that could meet the needs for the clinical area.

Given the discussion, the objective from the manufacturers stand point (via seating) became to find a way to deliver all the benefits of mesh from the user's perspective and meet the stringent requirements of the environment (the



clinical area). via seating found that copper was widely used in surfaces for infectious disease control purposes on door knobs, hand rails and that healthcare facilities use of copper was pervasive across the US. via seating identified Cupron, Inc. as one of the largest suppliers of copper products to the healthcare sector.

Cupron, Inc. is a copper-based antimicrobial technology company that harnesses the unique properties of copper for healthcare, consumer, industrial and military applications. Cupron embeds and infuses specified copper compounds in select polymers that enable finished products to deliver the desired impact. Unlike topically-applied solutions, Cupron's durable embedded copper technology does not wash off or rub off. Cupron have patented this proprietary technology and has multiple unique public health claims from the US Environmental Protection Agency (EPA). In 2013, Cupron's technology in a fiber and fabric reviewed the first and only EPA public health claim for specific anti-fungal protection. That same year the first clinical trial of Cupron medical textiles was conducted at Reuth Hospital in Tel Aviv, Israel. In 2014, Sentara Healthcare conducted another trial of Cupron medical textiles and was successful. Sentara expanded deployment of Cupron Medical Textiles to all of its 12 hospitals as a result of this research.

Study Outline Sentara Healthcare

Method:

Sentara performed a study with a control group, assessing development of HAIs due to multidrug resistant organisms (MDROs) and *Clostridium difficile* in the acute care units of a community hospital following the replacement of a 1970s-era clinical wing with a new wing outfitted with copper-impregnated composite hard surfaces and linens.

Results:

The study was conducted over a 25.5-month time period that included a 3.5-month washout period. HAI rates obtained from the copper-containing new hospital wing (14,479 patient-days; 72 beds) and the unmodified hospital wing (19,177 patient-days) were compared with those from the baseline period (46,391 patient-days). The new wing had 78% ($P = .023$) fewer HAIs due to MDROs or *C. difficile*, 83% ($P = .048$) fewer cases of *C. difficile* infection, and 68% ($P = .252$) fewer infections due to MDROs relative to the baseline period. No changes in rates of HAI were observed in the unmodified hospital wing.

Conclusion:

Copper-impregnated composite hard surfaces and linens may be useful technologies to prevent HAIs in acute care hospital settings. Additional studies are underway to determine whether reduced



HAIs can be attributed to the use of copper-containing antimicrobial hard and soft surfaces.

Two additional separate studies were published in the International Journal of Infectious Diseases, using crossover, double-blind controlled trials in clinical areas utilizing copper oxide biocidal textiles, the same process used to infuse copper into Genie Copper Mesh®, a significant reduction in HAI indicators, Antibiotic utilization, fever days, and related treatment costs. The other study was performed over a 7 month period at the Herzog Medical Center in Israel with similar powerful results.

These clinical trials tested the efficacy of EOScu Preventive | Biocidal Surfaces and copper-infused linens and resulted in statistically significant reductions in hospital-associated infections (HAIs). Published in the American Journal of Infection Control, this study - the largest of its kind in the world - shows that copper-impregnated hard surfaces (EOScu) and linens (Cupron Medical Textiles) resulted in an 83% reduction in C. difficile infections and a 78% reduction in overall infections due to multi-drug resistant organisms (MDROs) and C. difficile.

Given this new research, what does this mean for the Clinical Environment and the people in them?

Given these trial successes via seating decided to partner with Cupron, Inc and combine their strengths; via seating being an industry recognized manufacturer of quality, ergonomic, task seating solutions and Cupron, Inc being at the forefront of researching applications that harness the benefits of copper.

It was determined that the mesh back task chair (Genie™ Series) already meets the needs of the clinical area in terms of the performance, design and ergonomic requirements (outlined earlier) but not the infectious disease requirements i.e. needed to be antimicrobial and bleach cleanable. Therefore, Cupron and via seating went about meeting this need by infusing Cupron copper technology into the via seating elastomeric, four way stretch mesh material. The result was the first ever copper-infused mesh back task chair. This chair is called Genie Copper Mesh®.



The research proving efficacy of Genie Copper Mesh® back task seating.

Up to this point the accepted task chair solution for clinical areas was to have a high performance chair that was upholstered in an antimicrobial textile specifically designed for healthcare to be bleach cleanable.

Third Party Testing:

Objective:

via seating set out to prove that the Genie Copper Mesh® would be equal to this current accepted standard i.e. comparing Genie Copper Mesh® performance to current accepted technical textiles for healthcare.

The testing was performed using three different microorganisms; Staphylococcus aureus, a gram positive bacteria, Klebsiella pneumoniae, a gram negative bacteria and Candida albicans (a yeast) per AATCC-100 on the following surface textiles currently in use in clinical environments:

- Krypton
- Silvertex
- Silica
- Genie Copper Mesh®
- Genie® Mesh (without infused copper)

Results:

Over a two hour contact time, Genie Copper Mesh® reduced the three bacteria by 99.9%. Silvertex had comparable results.

These results showed that the Genie Copper Mesh® outperformed the textiles currently in use in clinical areas. Therefore, this mesh back task chair is better than a fully upholstered back task chair for clinical areas and is equal to chairs upholstered with Silvertex.

See third party lab test Appendix 1: The test report lists the concentrations in comparison to the aforementioned textiles.

Another third-party test was conducted:

Objective:

via seating set out to prove that the Genie Copper Mesh® would impact bacteria within one hour of contact on both colors i.e. copper-infused mesh is available in black or natural copper color.

Method:

- Samples again were tested to AATCC100-2012; Assessment of antimicrobial finishes on textile materials.
- Samples were cut to 2" x 2", 5 layers stacked high, inoculated with single organism cultures of either S. aureus K. pneumoniae.

- Target inoculum concentration was 100.000 to 300.000 cfu/ ml;
- Inoculum size was 1ml per swatch. Samples were incubated at 37 +/-2 C.
- Concentrations were evaluated at the start of the test (this is time "zero") and at the intervals of 30min, 60min, 90min and finally at 120min.
- To enumerate the bacterial count the swatches were transferred into 100ml neutralizing solution, shaken vigorously for 60 seconds and an aliquot transferred to the Tempo vial for enumeration.

Results:

- Both sample colors (black and Copper mesh samples) show reduction against both organisms, as early as 30 min; regardless of color of the copper-infused mesh sample.
- Both samples are fast reacting; the dye process does not affect the efficacy of the product.

See lab test Appendix 2: The test report lists the concentrations at given time points and underneath the resulting % reduction.

The research showing Genie Copper Mesh[®] approved cleaners for infectious disease control areas.

DISINFECTANTS/CLEANERS COMPATIBLE WITH CUPRON[®] / FABRICS / GENIE COPPER MESH[®]:

While Genie Copper Mesh[®] is biocidal, it is self-sanitizing and therefore is outside the parameters for other textile surfaces. However, the following disinfectants and cleaners have been reviewed for compatibility with Genie Copper Mesh[®]. This testing was necessary as a comparison to practices currently underway with other surface materials.

While not all of these disinfectants/cleaners have been physically tested, Cupron believes these to be compatible with Cupron[®] technology, based on the published technical information provided by the corresponding company/manufacturer and when used as per the guidelines/instructions provided on the label.

Before using any of these cleaners, Cupron and via seating recommends testing a small inconspicuous area on the fabric to ensure

no discoloration results prior to applying on larger areas.

1. CLOROX® Broad Spectrum Quaternary Disinfectant Cleaner
2. CLOROX® Healthcare bleach germicidal cleaner
3. CLOROX® Dispatch
4. CLOROX® Clean-Up® Disinfectant Cleaner with Bleach
5. ECOLAB ASEPTI-WIPE-II
6. GOJO PURELL® Healthcare Surface Disinfectant
7. METREX Cavicide™
8. METREX Envirocide™
9. SEALED AIR VIREX II 256
10. SEALED AIR AVERT™ Disinfectant Cleaner
11. SEALED AIR Whistle® All Purpose Disinfectant Tb Cleaner
12. SEALED AIR EXPOSE® II 256
13. STERIS Coverage® Spray TB
14. STERIS Coverage® Plus NPD
15. STERIS Coverage Spray Coverage® Plus Germicidal wipes

DISINFECTANTS/CLEANERS
INCOMPATIBLE WITH CUPRON® FABRICS
/ GENIE COPPER MESH®

The following disinfectants/cleaners have been reviewed for compatibility with Cupron® chair mesh fabric and are expected to be incompatible with Cupron® technology, based on the published technical information provided by the

corresponding manufacturer. It is expected that either aesthetics (discoloration etc.,) and/or efficacy of the product will be impacted upon using the following cleaners.

1. CLOROX® Healthcare® Fuzion™ Cleaner Disinfectant
2. CLOROX® Healthcare® Hydrogen Peroxide Cleaner Disinfectant
3. ECOLAB Peroxide multi-surface cleaner
4. ECOLAB Oxycide™
5. METREX Metricide™
6. SEALED AIR Oxivir® TB Spray
7. SEALED AIR Oxivir® TB Wipes
8. SEALED AIR Accel® FIVE TB
9. SEALED AIR ALPHA-HP® Multi-Surface Disinfectant Cleaner
10. SEALED AIR PERCEPT™ Concentrated General Virucide Disinfectant
11. SEALED AIR PERDIEM™ Disinfectant Cleaner
12. SEALED AIR SURETOUCH® Disinfectant Cleaner
13. STERIS Coverage® Spray HB plus Disinfectant Cleaner
14. STERIS Environ™ Vesphene™ Sterile Phenolic Disinfectant
15. STERIS Vesphene® Ilse Non-sterile Disinfectant Cleaner

Lab Manager; reviewed by Dr. Kanmukhla
on 08/07/2017 Page 1 of 7

CUPRON IN HOUSE EVALUATION ON
THE EFFECT OF VIREX® II 256 (DIVERSEY)
& OXIVIR® TB (VIROX) ON CUPRON
FABRIC / GENIE COPPER MESH®
BACKGROUND

Objective: Testing fabric's compatibility
with two common hospital disinfectants,
DIVERSEY™/MC VIREX® II 256 (one step
disinfectant cleaner and deodorant) and
VIROX® DIVERSEY™/MC OXIVIR® TB
(general virucide, bactericide,
tuberculocide, fungicide, & sanitizer).

Method:

Cupron has evaluated the chair fabric for
compatibility based on visual/cosmetic
changes to the fabric as well as for
potential impact on antimicrobial efficacy.
Fabric Application & Construction: Woven
Chair fabric for hospital seating; Cupron
polyester (4/150/48) in weft, elastomer in
warp.

Conclusion:

- After 10 exposures to either
hospital disinfectant, the copper-
infused mesh did not show any
cosmetic or visual changes of
concern.
- After 10 exposures , VIREX® II 256 is
found to be compatible and did not
impact antimicrobial efficacy of the
copper-infused mesh chair fabric
- After 10 exposures to OXIVIR® TB,
the copper-infused mesh chair

fabric still exhibited antimicrobial
efficacy but found to have reduced
efficacy compared to the
unexposed the copper-infused
mesh chair fabric sample

- Upon repeated exposure to Cupron
fabric, both disinfectants exhibited
color change.

Recommendation:

- VIREX® II 256 is recommended to
be used with the Cupron
technology
- After exposure to disinfectants, it is
highly recommended to wipe off
any residual disinfectant. This is
recommended standard operating
procedure for facility staff within
healthcare environments.

Prepared by Ms. Rachel Salvatori – Lab
Manager; reviewed by Dr. Kanmukhla on
08/07/2017.

Important Note:

It is very important to note, and is
understood, that healthcare facility
procedures for wipe down, bleach cleaning
activities vary from facility to facility. The
challenge of ensuring that these
procedures are being followed are the
burden of the healthcare facility manager
and infectious disease control department.



In Summary:

via seating has found that the best way to understand how to innovate and continue to be relevant in the rapidly changing marketplace is quite simply to listen to its customers, understand the challenges being presented and invest in research and development to find the solution.

In this case, it took a healthcare client to point out the challenges of meeting the requirements for infectious disease control areas (the environment) and the desire to support the requests and wishes of the people who work in them. As they pointed out "Happy nurses lead to happy patients". Taking the approach for caring for the caregiver was one that highly motivated via seating to examine this challenge further.

The result delivered a new innovation in healthcare textiles. This innovation has since been further validated by recognition from the furniture industry. NeoCon is the premier gathering for architects, designers, specifiers and institutional commercial clients in the US. NeoCon honors excellence in design, function and application for new furniture products (and other categories relating to the build environment) each year. The NeoCon Award was given to Genie Copper Mesh® in June 2017 for Innovation for healthcare textiles.

Further, the largest gathering for Healthcare Designers and end-users is the Healthcare Design Exposition. This is an annual event where this group awards 'The Nightingale Award' to new products that meet the requirements for healthcare environments. via seating Genie Copper Mesh® received the prestigious Silver Nightingale Award for healthcare textiles in November 2017.

This recognition further shows the need for products designed specifically to meet the requirements of clients generally. Having the mindset and capability to customize as it relates to new product development is rare. Doing so and delivering on this active listening endeavor furthers the reach and sets a higher standard for continuous improvement for all manufacturers.

This is what via seating strives to continue to do. Given the success of the Genie Copper Mesh® for the Genie® Task chair, via seating is now offering two other collections with the Copper-infused Mesh:

- Vista II – Copper Mesh Back, is a guest chair suitable for use in patient rooms, clinic waiting areas and across healthcare facilities.
- Splash – Copper Mesh Back, is a high-density stacking series that can be used across healthcare areas for training rooms, guest seating and even cafeteria areas.



Note:

All of the above copper-infused seating solutions from via seating are also being seen as a solution for multi-shift environments i.e. creating healthier sitting environments for shared workstations. This crosses over into general commercial applications for call centers, 911 areas and the like.

For more information on the products discussed in this paper see:

- 4u with copper mesh
- 4-UP with copper mesh
- Genie Copper Mesh®
- Reset with copper mesh
- Run II with copper mesh
- Splash with copper mesh
- Vista II with copper mesh

The United States Patent and Trademark Office has granted U.S. Patent Numbers 10986938 & 11389009 for Via Seating's Copper-Infused Mesh Seating

the Via copper mesh collection





More Information:

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1-800-433-6614

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800 East Leigh Street, Richmond, Virginia 23219.

Report Number CMI/16/1014AM

Sponsor Mr. Kenneth Swanson, VIA Seating

Antimicrobial Activity Test Report

Sample Information: Please see sample images on page #2 for further details

- | | |
|--------------------|--|
| 1. VIA – Silica | 4. Matrex – Cupron (Collage 04483 B17 W60) |
| 2. VIA – Krypton | 5. Matrex – Black swatch w/o AM additive |
| 3. VIA – Silvertex | |

Date Received: 10/03/2016

Date Completed: 10/13/2016

Test Information: AATCC TEST METHOD 100-2004 Antimicrobial Finishes on textile materials: Assessment of)

Inoculum Concentration (CFU/0.1ml)		<i>Staphylococcus aureus</i> (ATCC 6538)	<i>Klebsiella pneumoniae</i> (ATCC 4352)	<i>Candida albicans</i> (ATCC 10231)
Sample 1 VIA – Silica (CFU/Sample)	Initial contact time	1.05x10 ⁵	5.50x10 ⁴	1.00x10 ⁵
	2 hrs contact time	1.15x10 ⁵	6.50x10 ⁴	1.25x10 ⁵
	% Reduction	No Reduction	No Reduction	No Reduction
Sample 2 VIA – Krypton (CFU/Sample)	Initial contact time	1.05x10 ⁵	5.50x10 ⁴	1.00x10 ⁵
	2 hrs contact time	1.10x10 ⁵	4.50x10 ⁴	1.20x10 ⁵
	% Reduction	No Reduction	18.2%	No Reduction
Sample 3 VIA – Silvertex (CFU/Sample)	Initial contact time	1.05x10 ⁵	5.50x10 ⁴	1.00x10 ⁵
	2 hrs contact time	<1.00x10 ²	<1.00x10 ²	<1.00x10 ²
	% Reduction	>99.9%	>99.8%	>99.9%
Sample 4 Matrex – Cupron (CFU/Sample)	Initial contact time	1.05x10 ⁵	5.50x10 ⁴	1.00x10 ⁵
	2 hrs contact time	<1.00x10 ²	<1.00x10 ²	<1.00x10 ²
	% Reduction	>99.9%	>99.8%	>99.9%
Sample 5 Matrex – Black (CFU/Sample)	Initial contact time	1.05x10 ⁵	6.00x10 ⁴	1.00x10 ⁵
	2 hrs contact time	1.15x10 ⁵	<1.00x10 ²	1.10x10 ⁵
	% Reduction	No Reduction	No Reduction	No Reduction

Culture Medium: Nutrient broth (NB)

Growth Medium: Chrom[®]/Sabouraud dextrose agar

Inoculum Carrier: Sterile saline solution with 5.0%
NB+0.05% Triton X-100

Neutraliser: Letheen Broth



800 East Leigh Street, Richmond, Virginia 23219.

Conclusions: When tested according to AATCC 100, the Cupron and Silvertex samples exhibited 99.8% or higher reduction/ antimicrobial efficacy against *Staphylococcus aureus*, *Klebsiella pneumoniae* and *Candida albicans* in 2 hours of contact time.

Vikram Kanmukhla

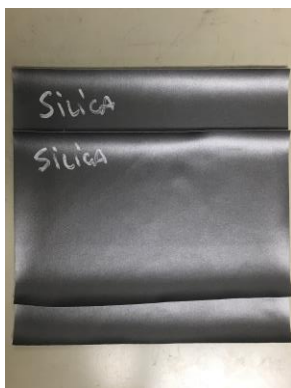
10/14/2016

Dr. Vikram Kanmukhla (Technical Reviewer)

Date

Sample images:

1. VIA – Silica



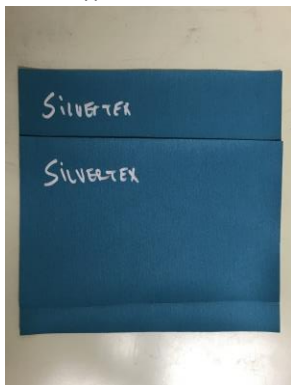
3. VIA – Silvertex



5. Matrex – Black swatch



2. VIA – Krypton



4. Matrex – Cupron





301 Conover Station SE; Conover, NC 28613

Josh Moseley
Via Seating
205 Vista Boulevard
Sparks, NV 89434

Received Date: August 10, 2018
Completed Date: August 15, 2018

REFERENCE:

TS 143112
Style: Copper Mesh
Color: Black
Description: Copper Infused Mesh

Sample Type: Woven Fabric
Sample Form: Yardage
Size: N/A

TEST RESULTS:

Antibacterial Finishes:

- Assessment of Antibacterial Finishes on Textile Materials - AATCC 100-2012

This test is accredited under the laboratory's ISO/IEC 17025 accreditation issued by the ANSI-ASQ National Accreditation Board. Refer to certificate and scope of accreditation L2238

Testing Results:

	Results: cfu/sample				
	Zero Contact Time	30 Minute Contact Time	60 Minute Contact Time	90 Minute Contact Time	20 Minute Contact Time
• Staphylococcus aureus ATCC 6538	1.00E+05	1.00E+03	1.00E+03	1.00E+03	1.00E+03
Percent Reduction from Zero Contact Time		99.00%	99.00%	99.00%	99.00%
	Zero Contact Time	30 Minute Contact Time	60 Minute Contact Time	90 Minute Contact Time	20 Minute Contact Time
• Klebsiella pneumoniae ATCC 4352	4.30E+05	1.00E+03	1.00E+03	1.00E+03	1.00E+03
Percent Reduction from Zero Contact Time		99.77%	99.77%	99.77%	99.77%

Calculate % reduction to formula 1) $100 (B-A)/B = R$; section 10.2

MANUFACTURING SOLUTIONS CENTER



301 Conover Station SE; Conover, NC 28613

Testing Information:

- Staphylococcus aureus ATCC 6538
- Klebsiella pneumoniae ATCC 4352
- Growth media: Tryptic Soy Broth
- Sample size # layers: 5
- Sterilization: none
- Neutralizer: 100ml Letheen Broth w. Tween
- Target inoc. Level: $(1.0-2.0) \times 10^5$ CFU/ml
- Inoculum carrier: 5% Nutrient broth
- Inoculum size: 1.0ml +/- 0.1ml
- Wetting agent: 0.05 % Triton X
- Contact time: 18 - 24 h
- Temperature: 37 +/- 2° C
- Samples are tested as submitted
- Samples are prepared and enumerated using automatic equipment; Tempo, BioMerieux.
- Cultures stored at 5° +/-2°C.

Reported:

Kaitlin Sigmon

Antimicrobial Testing

MSC – Testing Lab

(828) 327-7000 ext.4683

Reviewed:

Maria Curry

Antimicrobial Testing

MSC – Testing Lab

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The test results are based on the submitted sample(s) only. MSC/HTC's liability shall not exceed the fees paid for the testing reflected on this report. It is the customer's responsibility to ensure that they comply with all U.S. federal, state/ local laws & regulations. These tests are not to be used for marketing purposes without the express written consent of the Director of the Manufacturing Solutions Center at Catawba Valley Community College. The test report shall not be reproduced except in full, without written approval from MSC/HTC. All results will be kept confidential.



301 Conover Station SE; Conover, NC 28613

Josh Moseley
Via Seating
205 Vista Boulevard
Sparks, NV 89434

Received Date: August 10, 2018
Completed Date: August 15, 2018

REFERENCE:

TS 143113
Style: Copper Mesh
Color: Copper
Description: Copper Infused Mesh

Sample Type: Woven Fabric
Sample Form: Yardage
Size: N/A

TEST RESULTS:

Antibacterial Finishes:

- Assessment of Antibacterial Finishes on Textile Materials - AATCC 100-2012

This test is accredited under the laboratory's ISO/IEC 17025 accreditation issued by the ANSI-ASQ National Accreditation Board. Refer to certificate and scope of accreditation L2238

Testing Results:

	Results: cfu/sample				
	Zero Contact Time	30 Minute Contact Time	60 Minute Contact Time	90 Minute Contact Time	20 Minute Contact Time
• Staphylococcus aureus ATCC 6538	1.00E+05	1.00E+03	1.00E+03	1.00E+03	1.00E+03
Percent Reduction from Zero Contact Time		99.00%	99.00%	99.00%	99.00%
	Results: cfu/sample				
	Zero Contact Time	30 Minute Contact Time	60 Minute Contact Time	90 Minute Contact Time	20 Minute Contact Time
• Klebsiella pneumoniae ATCC 4352	4.30E+05	1.00E+03	1.00E+03	1.00E+03	1.00E+03
Percent Reduction from Zero Contact Time		99.77%	99.77%	99.77%	99.77%

Calculate % reduction to formula 1) $100 (B-A)/B = R$; section 10.2

MANUFACTURING SOLUTIONS CENTER



301 Conover Station SE; Conover, NC 28613

Testing Information:

- Staphylococcus aureus ATCC 6538
- Klebsiella pneumoniae ATCC 4352
- Growth media: Tryptic Soy Broth
- Sample size # layers: 5
- Sterilization: none
- Neutralizer: 100ml Letheen Broth w. Tween
- Target inoc. Level: $(1.0-2.0) \times 10^5$ CFU/ml
- Inoculum carrier: 5% Nutrient broth
- Inoculum size: 1.0ml +/- 0.1ml
- Wetting agent: 0.05 % Triton X
- Contact time: 18 - 24 h
- Temperature: 37 +/- 2° C
- Samples are tested as submitted
- Samples are prepared and enumerated using automatic equipment; Tempo, BioMerieux.
- Cultures stored at 5° +/-2°C.

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