

# Production Insight

Solutions for Critical Environments & Manufacturing Processes



PROTECTIVE APPAREL ✦ CHEMICALS ✦ PRODUCTION SUPPLIES

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# Production Insight

## Focused on Your Priorities

At VWR, we understand that many factors directly affect your bottom line.

That's why we've developed this new publication, *Production Insight* – to provide information and solutions to help you save time, money, and gain efficiency. We'll cover topics that are critical to your success, and provide you with the technical information you need to make educated decisions about the products and services you need.

### ***Production Insight*** Features Solutions For:

- Risk Mitigation
- Supply Chain Security
- Regulatory Compliance
- Business Continuity
- Change Control
- Inventory Optimization
- Process Development



## VWR® Protection Apparel

The competitively priced VWR Protection Apparel portfolio has been engineered to meet the demands of cleanrooms, critical environments, manufacturing facilities, research and clinical labs, and other specialized environments.

Our complete head-to-toe collection of single-use apparel offers comfort, durability, and the freedom to choose appropriate levels of protection for your environment's specific needs.

### The VWR Protection Apparel Portfolio Includes:

- |                 |             |               |
|-----------------|-------------|---------------|
| • Hoods         | • Coveralls | • Gloves      |
| • Bouffant Caps | • Lab Coats | • Shoe Covers |
| • Beard Covers  | • Frocks    | • Boot Covers |
| • Masks         | • Gowns     |               |
| • Face Shields  | • Sleeves   |               |



### Levels of Protection

VWR® Signature\*

Irradiated

Maximum

Advanced

Basic



For more information about VWR Protection Apparel, contact your VWR Sales Representative, call 800.932.5000, or visit [vwr.com](http://vwr.com) today.

\* Made with Dupont™ Tyvek® IsoClean® Material



# VWR® Protection Nitrile Gloves

- Provides reliable, durable, and comfortable hand protection during demanding cleanroom applications
- Textured fingers enhance grip on components
- Tapered, beaded cuff provides secure fit
- Static-dissipative to inhibit harmful static discharge
- Silicone-free material minimizes ionic contaminants and nonvolatile residue (NVR) transfer
- No natural rubber latex
- AQL level of 1.5 for pinholes
- For single use
- Color: White



VWR Protection Nitrile Gloves are manufactured from a synthetic copolymer of acrylonitrile, butadiene, and methacrylic acid (components that comply with FDA CFR 21). These gloves exhibit high tensile strength and strong permeation resistance against a wide variety of solvents, acids, and bases. Non-staining, non-smudging gloves reduce the risk of contamination to parts or components being handled by the user, even during prolonged wear.

To support cleanroom donning protocol, gloves are double-bagged in sealed polyethylene cleanroom bags (100 per bag, 10 bags per carton liner). Each carton is double-walled. IPA-resistant ink is used on bag and carton labels.

Gloves are rigorously tested and manufactured in an ISO Certified facility under stringent process controls to ensure that each product meets exacting quality standards and performs to specification. Our products are lot controlled and validated through independent lab testing.



Size	Cat. No.	Case of 1,000
<b>Advanced Protection Class 100 Nitrile Gloves*</b>		
X-Small	89130-834	418.28
Small	89130-836	418.28
Medium	89130-838	418.28
Large	89130-840	418.28
X-Large	89130-842	418.28
XX-Large	89130-844	418.28
<b>Maximum Protection Class 10 Nitrile Gloves†</b>		
X-Small	89130-848	482.27
Small	89130-846	482.27
Medium	89130-850	482.27
Large	89130-852	482.27
X-Large	89130-854	482.27
XX-Large	89130-856	482.27

\* ISO Class 5 (FED-STD-209E Class 100/M3.5) or higher cleanrooms

† ISO Class 4 (FED-STD-209E Class 10/M2.5) or higher cleanrooms

## DuPont™ Gripper™ Shoe and Boot Covers

### A Durable Slip-Resistant Solution

Part of the comprehensive DuPont Controlled Environments product portfolio, DuPont™ Gripper™ shoe and boot covers feature a highly engineered PVC sole material that helps resist slipping on slick surfaces. It's reinforced with a coarsely textured interior—so your feet stay put on the inside as well as on the outside.

#### Product Features of DuPont™ Gripper™ Shoe and Boot Covers

- Excellent durability and slip resistance, both wet and dry
- PVC sole material provides excellent barrier to liquid penetration
- Inside texture helps keep foot in place
- Available in DuPont™ Tyvek® IsoClean®
- Available gamma sterilized
- Available individually packaged or in bulk

Description	Packaging	Cat. No.	Case of 100
Shoe Cover	Bulk	89127-322	108.36
<b>Boot Covers w/Ankle Ties</b>			
Nonsterile Clean-Processed, Bound Seam	Individual	89127-334	236.00
Sterile Clean-Processed, Bound Seam	Individual	89127-336	273.86
Nonsterile, Bound Seam	Bulk	89125-640	179.72

Note: Clean-processed garments are processed to minimize particle shedding and individually packaged in an ISO Class 4 (FED-STD-209E Class 10/M2.5) cleanroom. Sterile garments are gamma sterilized to a Sterility Assurance Level (SAL) of 10<sup>-6</sup>.

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## + [COMFORT]

**NEW!** Manufacturing Process offers you a soft and comfortable nitrile glove that rivals the fit of latex.

## + [STRENGTH]

**NEW!** Revolutionary Nitrile Formulation delivers up to **60% stronger** material than leading brands.

# ENGINEERED PERFORMANCE

Are XCEED™ gloves the best gloves yet? *We think so!*

Our skillfully engineered **NEW** polymer technology delivers the right comfort and the right strength, all at the right price.

**NEW!**

Microflex®

**XCEED™**

POWDER-FREE NITRILE EXAMINATION GLOVES



## + [VALUE]

**NEW!** Value Packing enables XCEED gloves to **contain 250 gloves** per box and save you money, time, and storage space, and is better for the environment.

Size	Cat. No.	Box of
Extra Small	<b>89174-538</b>	250/ <b>34.71</b>
Small	<b>89174-540</b>	250/ <b>34.71</b>
Medium	<b>89174-542</b>	250/ <b>34.71</b>
Large	<b>89174-544</b>	250/ <b>34.71</b>
Extra Large*	<b>89174-546</b>	230/ <b>34.71</b>

\* 230 gloves per box, by weight

**MICROFLEX®**  
THE MOST TRUSTED NAME IN GLOVES®

# Protective Face Masks for the Cleanroom

## VWR® Maximum Protection Cleanroom Masks

- Superior protection against bacteria and particles
- Highly breathable and fluid-resistant
- Soft and hypoallergenic

Cleanroom masks feature three-ply construction for superior particle and bacterial filtration efficiency. Available with spandex ear loops or polypropylene ties that are ultrasonically welded to maintain softness and protect against particulates. Latex-free. Designed for use in ISO Class 7 (FED-STD-209E Class 10,000/M5.5) or higher cleanroom environments.

Bacterial Filtration Efficiency: 99.3-99.7%

Particle Filtration Efficiency: 99.0-99.27%

Dimensions (L x H): 17.5 x 9.5cm



414004-667

## VWR® Maximum Protection Antifog Full Face Shields

- Protect front and side of face from fluid splash
- Low-glare shield provides distortion-free vision

Antifog full face shields provide total facial splash protection and can be worn for extended periods. Face shields fit easily over eyewear, and a soft polyurethane foam sponge fits snugly against the forehead.

Dimensions (L x H): 33.5 x 19cm

Thickness: 0.18mm (±0.02mm)



Both rigorously tested and manufactured in an ISO Certified facility under stringent process control.

Description	Color	Cat. No.	Case of 500
Mask w/ Ear Loops	Blue	414004-667	155.67
Mask w/ Ties	White	414004-669	158.44

Description	Cat. No.	Case of 200
Antifog Full Face Shield	414004-679	420.98

NOTE: Packaged 50 masks per heat-sealed, cleanroom-compatible bag, 10 bags per case



## KIMTECH PURE® G3 Sterile STERLING® Nitrile Gloves

### Product Features

- Latex-free
- Hand-specific pairs
- Static-dissipative in use
- 4.0 mil thick
- Beaded cuff
- Walleted and pouched in polyethylene
- Recommended for ISO Class 3 or less critical cleanroom environments

Available in 12in. length

Walleted and pouched in polyethylene



KIMTECH PURE® G3 Sterile STERLING® Nitrile Gloves										Packaged in a Class 100 Cleanroom		
Description	VWR Cat. No.	6	6.5	7	7.5	8	8.5	9	10	Pairs/Bag	Total/Case	Price
KIMTECH PURE® G3 Sterile STERLING® Nitrile Gloves - 12in.	KCP Code	89135-370 11821	89135-372 11822	89135-374 11823	89135-376 11824	89135-378 11825	89135-380 11826	89135-382 11827	89135-384 11828	30/10	300	462.60

**KIMTECH**  
PURE® BRAND



# The Multiple Benefits of Single-Use Garments Made with DuPont™ Tyvek®

The DuPont™ Controlled Environments portfolio offers a comprehensive selection of single-use cleanroom garments and accessories designed for use in pharmaceutical, medical device, and biotech facilities that require high standards for microbiological contamination control.

Garments made with DuPont™ Tyvek® have a long history of use in cleanrooms due to their excellent barrier to particles, microorganisms, and non-hazardous light liquid splash. They are comfortable, durable, and available for different cleanroom applications.

**Quality** - Single-use apparel provides consistent and reliable quality and eliminates concerns about cross-contamination that can occur with laundering or compromised performance due to multiple wash and sterilization cycles.

**Flexibility** - The DuPont™ single-use apparel program allows you to order only the quantities that you plan to use, which offers flexibility as your needs change.

**Cost Control** - Single-use garments eliminate budget uncertainties associated with garment repair, damage, and loss, helping you to better predict expenditures.

**Reusability** - There are companies interested in recycling DuPont™ Tyvek® IsoClean® single-use garments and accessories, such as coveralls, lab coats, aprons, sleeves, pants, shoe covers, and boot covers.

Two of the most popular products in the DuPont™ Controlled Environments portfolio of single-use garments and accessories are:

**DuPont™ Tyvek® IsoClean® Garments**

**DuPont™ Gripper™ Shoe Covers and Boot Covers**

Description	Packaging	Cat. No.	Case of
Coverall*	Individual	89127-208	25/ 448.48
Coverall w/ Elastic Ankles	Bulk	80076-948	25/ 197.26
Frock w/5-Snap Front & Bound Neck	Bulk	80077-266	30/ 302.81
Boot Cover w/Ankle Ties & Serged Seam	Bulk	89127-326	100/ 179.70
Hood*	Individual	89127-356	100/ 514.34

\* Clean-processed– processed to minimize particle shedding and individually packaged in an ISO Class 4 (FED-STD-209E Class 10/M2.5) cleanroom.

All items listed above are DuPont™ Tyvek® IsoClean®.

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# Latex Allergies & Protective Gloves: What You Need to Know

By: Carolina Krevolin, Category Manager, Scientific Gloves, Kimberly-Clark Professional

There are many different types of glove technologies, and performance and comfort are the factors that need to be considered when selecting a cleanroom glove. Many individuals have latex allergies, and being aware of these allergy issues is important, especially when it comes to selecting protective gloves for the workplace.

## GLOVE TECHNOLOGY

Cleanroom gloves are typically made from vinyl, natural rubber latex, nitrile, or chloroprene. The Global Society for Contamination Control outlines advantages and disadvantages of each:

- **Vinyl** – Known for being very clean, inexpensive, and static dissipative. However, vinyl gloves retain heat and have poor moisture vapor transmission.
- **Natural Rubber Latex** – Durable and easy to manufacture. However, it has no inherent static-dissipative features. Some people have allergies to the proteins found in natural latex, which can result in painful rashes.
- **Nitrile** – Offers very good puncture resistance and exhibits broader chemical resistance than natural latex, especially with solvents. Nitrile also has very good static dissipative features not found in natural rubber latex.
- **Chloroprene** – Not widely used in the cleanroom industry, but has characteristics similar to those of nitrile.

A glove's material can have a dramatic influence on its comfort. For example, latex gloves are typically viewed as being more comfortable, while vinyl gloves tend to be uncomfortable due to the rigid nature of vinyl. Nitrile gloves are now becoming comfortable, however. In fact, some suppliers are using new nitrile-based production technologies to combine the sensitivity of latex with the protection of nitrile for gloves that provide the best of both worlds.

## THE IMPLICATIONS OF LATEX IN YOUR ENVIRONMENT

Type 1 latex sensitivity develops when genetically predisposed individuals are repeatedly exposed to natural rubber latex. Symptoms appear when the exposure reaches an individual's unique threshold level. Those with latex sensitivity risk a life-threatening reaction and should be treated as latex-allergic.

Latex protein sensitivity is on the rise due to repeated exposure to latex products. In the U.S., the number of those prone to allergies is currently more than 50 million. A direct link has been made between a reduction in exposure to latex and a reduction in latex allergy in the healthcare industry. At the Mayo Clinic in Rochester, Minnesota, cases of latex allergy have dropped from 150 to 27 per 100,000 workers since 1993. Under the Americans with Disabilities Act, reasonable accommodations must be made for workers deemed to be unable to perform essential job functions. If exposure cannot be prevented, sensitized workers must be removed from the workplace.

The cost of treating a latex allergy case is high. About 70% of reported workers' compensation claims resulting from latex allergy sensitivity have resulted in awards to the workers, and the rate is on the rise. OSHA has indicated that a "safe zone" may be needed to protect workers sensitized to latex. And NIOSH, the National Institute for Occupational Safety and Health, has published recommendations for minimizing latex-related health problems in workers, while still protecting them from infectious materials. These include reducing exposures, using appropriate work practices, training and educating workers, monitoring symptoms, and substituting non-latex products when appropriate.



## WHAT'S THE KEY TAKEAWAY?

To reduce the risk to latex sensitive employees, labs, cleanrooms, and other workplaces should take steps to become latex safe. Switching to a synthetic glove like nitrile is an important step. Nitrile gloves are equal to latex in barrier protection and comparable in fit and feel.

## WHAT'S NEEDED?

A highly protective, latex-free glove that delivers exceptional value.

## WHAT'S NEW?

The STERLING® Nitrile Family of Gloves reduces latex exposure while delivering the benefits you need, like protection, comfort and value. STERLING® Nitrile Gloves combine the protection of nitrile with the sensitivity of latex and superior strength. They also help reduce environmental impact by delivering more gloves per case than traditional gloves, leaving a smaller environmental footprint. Get performance and comfort in an affordable, latex-free glove for diverse and demanding workplace environments.

Providing a safe work environment is not only the right thing to do for your employees, it's your duty under the law. Eliminate the risk of latex allergy with a high-performance, high-value glove that's comfortable and "green."





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- Trusted supplier and partner—cGMP quality systems, production, packaging, and warehousing

ANGUS is the inventor, the leading manufacturer, and only *fully* back-integrated manufacturer of **TRIS AMINO™** Tromethamine products.

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- **Product Grades** – Materials tested and labeled to meet ACS, SEMI, and reagent grades
- **USP Water** – Validated ultrapure water system produces water to the USP standard; exceeds water requirements for most microelectronics applications
- **Analysis** – Experienced, degreed chemists use the most up-to-date instrumentation and methods to generate analytical results, and have the ability to develop analytical test methods specifically for your product



- **Unit Dose Filling** – Highly accurate liquid chemical filling gives customers the opportunity to have a "unit dose" fill in a package to very tight tolerances
- **Packaging Options** – Container choices range from 500mL bottles through drums, totes, and tank wagons. We will package your finished product in your specified packaging, or we can utilize our standard packaging

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Purity in your  
laboratory.



Formerly Mallinckrodt® Chemicals

**Macron™ Chemicals:**  
A new name for  
consistency in  
your process.



*Formerly Mallinckrodt Baker*

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**#1 SELF-WRINGING Cleanroom Mop**

**With VWR® Collection Refills**

**ABSORB**

**DISINFECT**


**CLEAN**

***The original and easiest to use self-wringing mop for the CE industry. Forget the bulky system! Use one mop to pick up spills and to clean and disinfect your walls, floors, and ceilings!***

Description	Size, in.	Cat. No.	Each
Aluminum Extendable Roll-O-Matic® Mop w/ Color-Coded Handle	58-76	94001-380	169.60
Stainless Steel Roll-O-Matic Mop	48	94002-802	168.30
Stainless Steel Roll-O-Matic Mop	72	89092-938	334.40

VWR Refills for Roll-O-Matic Mop	Cat. No.	Case of 12
Stainless Channel, Universal Use	89032-180	254.29
Galvanized Channel, Universal Use	89032-176	154.70
Stainless Channel, Adhesive-Free Polyester Lamination, Disinfecting/Light Cleaning	89032-182	246.14
Stainless Channel, Adhesive-Free Microfiber Lamination, Deep Cleaning/Disinfecting	89032-184	252.47

NOTE: All featured are 14in. wide, autoclavable; Color: blue



## VWR® Production Wipers

### Polyester Wipers

- 100% continuous-filament polyester knit
- Laser cut with sealed edges
- Minimum particles, fibers, extractables, and ions
- Ultra clean, highly absorbent, and durable
- Laundered and packaged in an ISO Class 4 (FED-STD-209E Class 10/M2.5) cleanroom
- Comply with RoHS 2002/95/EC



VWR Polyester Wipers are made from 100% virgin-grade, continuous-filament polyester in a double-knit, no-run interlock pattern to provide maximum cleanliness and absorbency. Sealed edges limit particles and fibers to an absolute minimum, ensuring excellent performance in environments that demand low levels of contaminants. Designed for cleaning surfaces and controlling spills in ISO Class 3 (FED-STD-209E Class 1/M1.5) or higher cleanroom environments, these durable wipers resist fiber release and abrasion under rigorous use, even when wiping rough surfaces.

Dimensions, cm (in.)	Cat. No.	Pack of 150	Case of
22.9 x 22.9 (9 x 9)	414004-517	46.12	1,200/ 307.48
30.5 x 30.5 (12 x 12)	414004-518	80.51	900/ 460.05

### Nonwoven Wipers

- Hydroentangled 55% cellulose and 45% polyester
- Highly absorbent with maximum tensile strength
- Low particles, fibers, extractables, and ions
- Clean and economical with knife-cut edges
- Contain no chemical binders
- Comply with RoHS 2002/95/EC



VWR Nonwoven Wipers are made from a hydroentangled blend that combines the strength and cleanliness of synthetic polyester with the high absorbency of cellulose. These soft, economical wipers are designed for cleaning surfaces and controlling spills in ISO Class 6 (FED-STD-209E Class 1000/M4.5) or higher cleanroom environments.

Dimensions, cm (in.)	Cat. No.	Pack of	Case of
22.9 x 22.9 (9 x 9)	414004-515	300/ 36.77	6,000/ 612.98
30.5 x 30.5 (12 x 12)	414004-514	150/ 38.43	3,000/ 591.00

All wipers are vacuum-packed in solvent-safe, cleanroom-compatible polyethylene with a label on each inner bag.





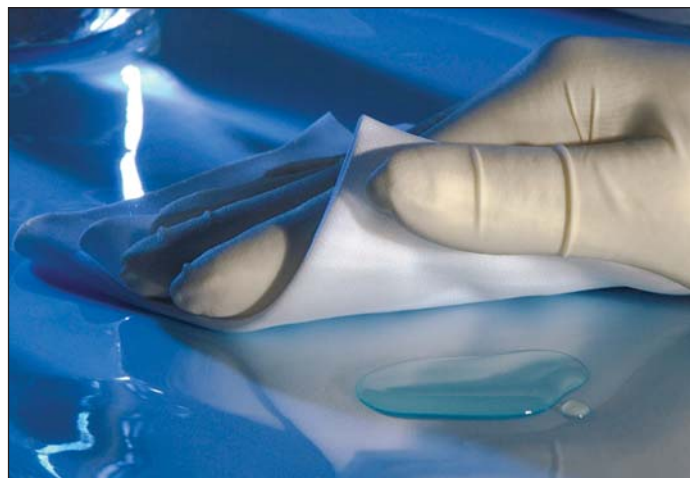
# Conquering Cleaning Challenges: Critical for Operations

By: Anne Marie Dixon, Cleanroom Management Associates, Inc.

Cleanrooms and controlled environments must be maintained to reduce the risk for patient and process. Maintaining the cleanroom at its designed level is the purpose of cleaning and/or sanitization. The air quality of any cleanroom or controlled environment is based on design and HEPA (High Efficiency Particulate Airflow) filtration. The air quality together with cleaned/sanitized surfaces will reduce the risk of contamination from the environment.

However in the last five years, the industry issues on cleaning and sanitization have been complex. Industrial (Microelectronics, Aerospace, etc.) and Healthcare (Medical Device, Biotech, Pharmaceutical, etc.) companies have struggled to maintain cleanrooms and controlled environments. This article will review the fundamentals of proper cleaning and discuss some of the current problems.

The Institute of Environmental Sciences and Technology (IEST), Arlington Heights, Illinois, publishes Recommended Practice (RP), CC018.4, "Cleanroom Housekeeping: Operating and Monitoring Procedures." This document discusses the tools, methods and techniques, and testing for surfaces in cleanrooms and controlled environments. This document is also referenced and detailed in ISO 14644-5, Cleanrooms and Associated Controlled Environments, Part 5: Operations.



## WHAT HAS HAPPENED?

In the Industrial market, the push to reduce cost has created the need for cheaper supplies and reduced cleaning frequency. In some cases, the materials are not compatible with the class of the cleanroom and have created the risk for increased particles and fibers. The reduced cleaning frequency and increased production requirement has also added to the risk. In addition, staff reductions have created the need for "speed" in cleaning, and in some cases the elimination of some surface cleaning. Contamination control becomes a difficult challenge if the cleanroom or controlled environment is not maintained. Random particle counting may not reflect the actual burden to the room or surfaces.

In the Healthcare market, it is believed that if a little sanitizer is good, then "drowning" the cleanroom can only be better. This incorrect thinking is based on two major concerns: environmental monitoring issues concerning surfaces that fail test methods or microorganisms that are not controlled, and the misunderstanding of what constitutes as "contact time."

## SANITIZATION – APPLICATION OR "DROWN"

How much disinfectant is enough? The disinfectant selection is based on product, process, surface compatibility, and microbial efficacy studies. Contact time is NOT visible time. Contact time is the time element needed for the disinfectant to be effective. This is based on the monolayer wetting of a surface as determined in validation. Surfaces should be coated uniformly with proper tools and the proper techniques. Base disinfectants must be rotated with proper sporicidal agents to reduce the risk from mold. Disinfectants must be properly prepared (dilution, type of water, etc.). For more on "contact time," see page 14.

## SO, WHAT IS THE SOLUTION?

The materials for cleaning and sanitization must be compatible with the classification of the facility. There are options for all types of cleanrooms and these should be explored. Also, the techniques must be correct. Improper techniques can create particle "showers," (transfer of contaminants from one surface to another), and generally result in inadequate cleaning.

(Continued on page 12)

(Continued from page 11)

IEST RP-CCO18.4 includes methods for cleaning and sanitizing a surface in a cleanroom. These methods have been tested and validated for particulate and microbial removal efficiency. Improperly performed cleaning and sanitization with the wrong materials or techniques could result in major process or product quality issues.

The frequency of cleaning in industrial facilities can be reduced. However, testing should be performed to support the reduction in frequency. In my experience, gownrooms and airlocks should be cleaned with a high frequency. This approach will help maintain the main process areas and reduce risk from contamination of personnel and admittance of items (airlocks). IEST RP-CCO18.4, lists test methods for understanding the contamination on a surface. These methods are ranked by the size and type of particle that can be detected, and both manual and automated methods are provided (**Figure 1**).

Test Method (IEST RP-CCO18.4)	Detectable Particle Size	
	Nonviable	Viable
6.1.1 Wipe Visual Test	>50µm	—
6.1.2 Ultraviolet Light Inspection	>20µm	—
6.1.3 High-Intensity, Oblique White Light Inspection	>20µm	—
6.1.4 Counting and Sizing Particles with an Optical Microscope	>5µm	—
6.1.5 Automated Particle Fallout Test and Optical Fallout Characterization	>5µm (Optical Microscope) >0.2µm (Laser)	—
6.1.6 Surface Particle Detector Method	>0.3µm	—
6.1.7 Surface Cleaning Efficiency Method	>20µm	—
6.2.1 Contact Plate Method (for Flat Surfaces)	—	CFUs*
6.2.2 Swab Method (for Non-flat Surfaces)	—	CFUs*

\* Colony-Forming Units

Figure 1

With the testing results for primary and secondary surfaces, a risk assessment can provide an unbiased examination of a cleaning process frequency. There are many risk tools that can be applied to the controlled environment and cleanroom industry. This application is best suited for a Failure Mode and Effect Analysis (FEMA) model, a systematic method of identifying and preventing problems before they occur.

SUMMARY

Cleaning and sanitization is a critical part of operations. With the proper tools, methods, and techniques, the cleaning frequency of an Industrial facility can be assessed to reduce risk and control cost.

Proper sanitization of Healthcare cleanrooms and controlled environments can reduce risk by employing proper techniques. Sanitization requires coating of surfaces with validated disinfectants. The amount of solution must also be controlled to ensure that the HVAC system, equipment, and surfaces are not damaged.

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VWR Tubing



VWR Gloves



VWR Wipers



VWR Swabs

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# Which Mop For My Production Area? Check Micronova!

When it comes to cleaning in controlled environments there is no "one-size fits all." Differing classifications within one production line, combined with the challenge that hoods, isolators, and fixed equipment pose, requires a well-designed suite of products. Simplicity and efficiency are essential.

The chart below represents mop heads and hardware geared to cope with typical applications. Pharmaceutical mop materials are economical, autoclavable, and resistant to strong cleaners and disinfectants. Most are available validated SAL 10<sup>-6</sup>. Hi-tech cleaning choices feature those materials which are absorbent and low linting. Almost all the mops featured can be laundered and re-used to address cost and environmental concerns. Hardware is generally electropolished stainless steel – adaptable, interchangeable, and designed to resist heat and strong chemicals. For details and pricing, shop vwr.com.

## Class 1 - 100

Wafer Production  
& Lithography Warehousing



Description	Cat. No.
<b>Floors</b>	
MicroMop™	68400-001
<b>Floors &amp; Walls</b>	
M-Zone™ SnapMop™	89131-858
NovaClean™	68400-012
<b>Laminar Flow Benches &amp; Shelving</b>	
Isolator Tool	11310-602
T-Mop™	68400-398
Lab & Glass Cleaner	68400-018

## Class 100 - 10,000

Assembly, Packaging,  
& Cleanroom  
Support



Description	Cat. No.
<b>Floors</b>	
M-Zone SnapMops	89131-858
	89134-776
	89107-748
Twist Mop™	68400-248
<b>Photo-Resist &amp; Adhesive Residues</b>	
MegaClean™	68400-042
PolyMesh™ Sponge	68400-362

## Unclassified

Clean Construction  
& Light Industrial



Description	Cat. No.
<b>Floors</b>	
Twist Mop	68400-248
NovaSorb™	89040-114
<b>Floors &amp; Walls</b>	
Wrap Mops	89134-516
	89134-520
<b>High Traffic Cleaning</b>	
MegaClean	68400-042

## ISO 4-5

Aseptic & Sterile Processing



Description	Cat. No.
<b>Floors</b>	
PolyGen™ Mop IR	43300-075
LoopMop™ IR	68400-786
Slim T™ Cart w/ Wringer	68400-670
Slim T Wringer	94000-434
Slim T Box Wringer	89140-710
Irradiated Bucket Liner	68400-780
<b>Floors, Walls &amp; Lyophilizers</b>	
M-Zone SnapMop	89131-864
T-Mop, Sterile	89092-134
T-Mop, Nonsterile	89092-132

## ISO 4-5

Aseptic & Sterile Processing

## ISO 6-8

Pharmaceutical Production,  
Medical Device & Food Processing



Description	Cat. No.
<b>Floors</b>	
PolyGen Mop	68399-706
Loop Mop	68400-758
MegaSorb	89092-124
<b>Floors &amp; Walls</b>	
M-Zone SnapMops	89131-858
	89107-748
T-Mops	68400-398
	94023-878
NovaHol	68400-682
<b>Coving &amp; Overhead Piping</b>	
FlexBrush™	68400-718
FlexBrush Cover	68400-720
MegaSwat	68400-412
PolyMitt™	68400-518

Unclassified Areas,  
LAR/Veterinary  
Warehousing



Description	Cat. No.
<b>Floors</b>	
PharmaPly™	94000-430
J-Zone	89140-706
<b>Floors &amp; Walls</b>	
Wrap Mops	89134-520
	89134-516
SnapMop	89107-748
<b>Shutdown &amp; 'Custom' Cleaning</b>	
PolyMitt	94023-784
Brushes	89108-042
NovaCel Wipe	68400-131
NovaCel Sponge	68400-071

# Hard Surface Disinfectants: How Effective Are They Under Real-Life Conditions?

By: Lee Nesbitt, BMSc, Manager, Professional and Technical Services, Virox® Technologies Inc.



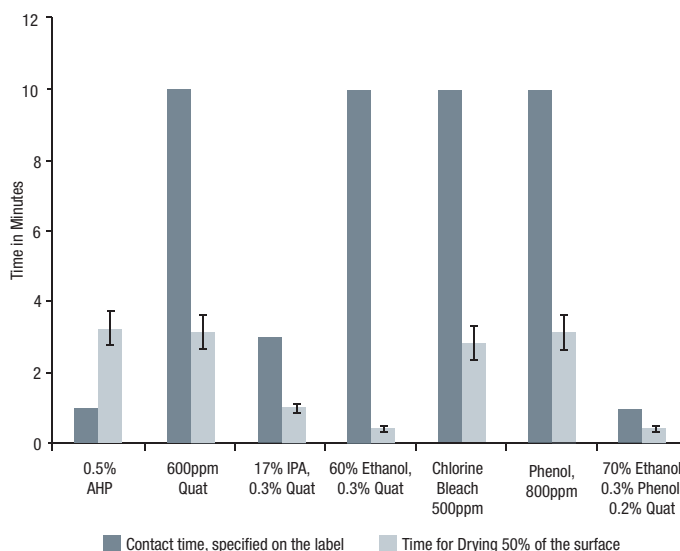
The use of disinfectants remains the backbone for environmental decontamination and infection control in multiple areas including laboratories, healthcare environments, and institutional settings. Numerous peer reviewed studies have confirmed that the environment can play a role in the transmission of microorganisms, and therefore thorough attention to cleaning and disinfecting is required to minimize this as a source of contamination. Unfortunately, the requirements for the effective use of most disinfectant chemistries are often very difficult to comply with under real-life conditions.

Instructions for the proper use of a disinfectant are indicated on the label of any EPA or Health Canada registered product. Diligent compliance of these instructions is necessary for proper and complete disinfection. This is particularly true of the contact time indicated on the label. The contact time, or dwell time, is the length of time that the surface must remain wet with the disinfectant in order to achieve the microbicidal kill as indicated on the label. Many would argue that this is the most critical step in the disinfection process. However, current practices generally only allow time for a surface to be wiped once and allowed to air dry. This begs the question – what are the potential implications of this practice when employed with the most commonly used disinfectant chemistries?

In a recent edition of the Journal of AOAC International (Vol. 93, No. 6), Dr. Navid Omidbakhsh, VP of Open Innovation at Virox Technologies Inc., expertly studied the level of kill actually achieved using the practices that are routinely used by disinfectant end users – wipe once and allow the surface to air dry. The study compared six different disinfectant chemistries: Accelerated Hydrogen Peroxide (Accel TB®, 0.5% AHP), a Quaternary Ammonium Compound (Quat),

a Quat-Alcohol blend (2 concentrations of alcohol), Bleach (Sodium Hypochlorite), a Phenol, and a Phenol-Alcohol blend. Each disinfectant chemistry was tested at its recommended use dilution to determine its performance in the following criteria: drying time, bactericidal activity during that period of time, and wettability – the ability of the disinfectant to spread evenly over a surface.

First, the drying time of each disinfectant was determined and compared to the product's label contact times. It was found that all disinfectants dried in less than five minutes with alcohol-based products drying significantly faster (less than one minute – some as quickly as 30 seconds). **Figure 1** provides a visual comparison of



**Figure 1:** Drying time versus label contact time of different disinfectants



the data. Accelerated Hydrogen Peroxide was the sole chemistry to remain wet on the surface longer than its required label contact time.

The second phase of the study tested the realistic microbicidal efficacy of each disinfectant by measuring their effectiveness against two key strains of bacteria at the contact time determined in the first phase of the study. For example, it was determined that bleach dried in three minutes, therefore its bactericidal efficacy was tested at the three-minute contact time rather than the label contact time of 10 minutes. The results are outlined in **Figures 2 & 3**. Being that Accelerated Hydrogen Peroxide was the only chemistry to remain wet for longer than its required contact time, it was not surprising that it was the only chemistry to achieve full bactericidal efficacy (>6 log reduction) across both strains of bacteria that were tested. The remaining chemistries all fell short of achieving true disinfection. The most alarming of which were the products containing higher concentrations of alcohol (60-70% ethanol blended with quat and/or phenol). These products dried exceedingly quickly (30 seconds or less) and in that period of time elicited minimal germicidal efficacy on the bacteria. Despite remaining wet for upwards of three minutes the same was also true of the concentrated quat and phenol. They achieved <2 log and <3 log reduction respectively.

The third and final phase of the study was to determine wettability of each disinfectant. This was assessed by applying each disinfectant to a hydrophobic (water repelling) epoxy resin surface and visually observing the distribution of the solution on the surface. Wettability is an important aspect of a disinfectant to ensure uniform exposure of the target surface to the solution for the required contact time. The results indicated that diluted concentrations of bleach, phenol, and quat did not contain sufficient wetting agents to completely cover the entire surface, therefore increasing the risk of incomplete disinfection. The other disinfectant solutions, including AHP, had sufficient wetting ability to uniformly cover the surface ensuring that disinfection of the entire surface will be achieved provided it remains wet for a sufficient period of time.

In summary, Dr. Omidbakhsh's study highlights the importance of selecting a disinfectant that will perform under real life conditions. As the study findings illustrate, most disinfectant chemistries are unable to elicit their full and complete effectiveness because they simply do not remain wet on the surface for a sufficient period of time. Accelerated Hydrogen Peroxide was the sole disinfectant chemistry to remain wet for its entire label contact time and achieve complete disinfection within this period of time. This rapid and realistic germicidal effectiveness provides end-users with the comfort and confidence that their disinfection needs can be met on a regular basis.

The Accelerated Hydrogen Peroxide product utilized for this study was Accel TB One Step Disinfectant Cleaner. Accel TB is a ready-to-use disinfectant cleaner that achieves bactericidal and virucidal efficacy (including effectiveness against difficult to kill non-enveloped viruses) in one minute, tuberculocidal efficacy in five minutes, and fungicidal efficacy in 10 minutes. Accel TB is available in liquid and pre-saturated wipe formats for greater ease and convenience.

Chemistry	Time	Dilution	Initial Titre	Final Titre	Log Reduction
AHP (0.5%)	1 min.	RTU	$1 \times 10^6$	0	6
Concentrated Quat (7.5%)	3 min.	1:128	$1 \times 10^6$	$2.45 \times 10^4$	1.65
Quat/Alcohol (3,000ppm Quat/17% IPA)	1 min.	RTU	$8.7 \times 10^5$	0	5.94
Quat/Alcohol (3,000 Quat/ 60% Ethanol)	30 sec.	RTU	$3.06 \times 10^6$	$7.77 \times 10^4$	1.59
Bleach (500ppm)	3 min.	RTU	$8.7 \times 10^5$	0	5.94
Concentrated Phenol (10.25%)	3 min.	1:128	$1 \times 10^6$	$1.05 \times 10^4$	1.99
Quat/Phenol/Alcohol (2,000ppm Quat/ 3,000ppm Phenol/ 70% Ethanol)	30 sec.	RTU	$1 \times 10^6$	$1.03 \times 10^5$	0.99

**Figure 2:** Microbicidal activity of selected disinfectants at their drying time against *Staphylococcus aureus*

Chemistry	Time	Dilution	Initial Titre	Final Titre	Log Reduction
AHP (0.5%)	1 min.	RTU	$1.37 \times 10^7$	0	7.13
Concentrated Quat (7.5%)	3 min.	1:128	$1 \times 10^6$	$3.64 \times 10^4$	1.45
Quat/Alcohol (3,000ppm Quat/17% IPA)	1 min.	RTU	$1 \times 10^6$	0	6
Quat/Alcohol (3,000 Quat/ 60% Ethanol)	30 sec.	RTU	$8.61 \times 10^5$	$3.0 \times 10^2$	3.73
Bleach (500ppm)	3 min.	RTU	$1 \times 10^6$	0	6
Concentrated Phenol (10.25%)	3 min.	1:128	$8.7 \times 10^6$	$2.63 \times 10^3$	2.52
Quat/Phenol/Alcohol (2,000ppm Quat/ 3,000ppm Phenol/ 70% Ethanol)	1 min.	RTU	$1.37 \times 10^7$	$1.47 \times 10^6$	0.96

**Figure 3:** Microbicidal activity of selected disinfectants at their drying time against *Pseudomonas aeruginosa*

#### REFERENCES

Omidbakhsh N. Theoretical and experimental aspects of microbicidal activities of hard surface disinfectants: are their label claims based on testing under field conditions? *The Journal of AOAC International*. 2010;93:6:1-8. <http://www.virox.com/download.aspx?ItemInfoID=474>



## Accel TB® Disinfectant & Accel® Concentrate

### Accel TB

#### Efficacy of Accel TB

- 1 minute general virucide and bactericide
- 5 minute tuberculocide
- 10 minute fungicide
- 30 second sanitizer

Like Accel, Accel TB is a powerful EPA registered intermediate level disinfectant that is safe and fast acting with a broad spectrum kill. Also based on AHP technology, Accel TB ready-to-use disinfectant solution and wipes are a better alternative to corrosive cleaners and smelly disinfectants. Compatible with an extensive list of common materials, including 316 and 304 stainless steel, natural and silicone rubber, and most plastics, Accel TB is ideal for use on environmental surfaces in lab animal facilities, pharmaceutical cleanrooms, compounding pharmacies, labs, and other GMP facilities.

Convenient presaturated Accel TB wipes, packaged 160 wipes/canister, make disinfecting work stations and lab areas effortless. Accel TB Disinfectant Solution is available in 32 ounce, 1 gallon, and 5 gallon containers. Trigger sprayers are also available for the 32 ounce bottles.

Accel TB Disinfectant Solution	Cat. No.	Each	Case of
946.3mL (32oz.)	89066-156	26.77	12/ 246.92
Trigger Sprayer for 946.3mL (32oz.)	89066-160	41.88	—
3.8L (1gal.)	89066-158	45.21	4/ 150.91
18.9L (5gal.)	94002-686	164.10	—
Accel TB Disinfectant Wipes*	Cat. No.	Pack of 160	Case of 12
15.2 x 17.8cm (6 x 7in.)	89176-666	24.64	295.70

\* Meltblown polypropylene wipes, 160/canister

### Accel Concentrate

#### Efficacy of Accel Concentrate

- 5 minute bactericide, virucide, and fungicide
- 3 minute sanitizer (concentrate)

Don't let your disinfectants corrode your lab equipment and eat into your profits. Accel disinfectants are a safer, faster, cleaner, more effective way to clean and disinfect your facility. Accel provides comfort and confidence that commonly touched surfaces are rendered safe to use.

Accel Concentrate is a powerful intermediate disinfectant in a concentrated format that is diluted based on intended use. Designed for all areas that require environmental cleaning and surface disinfection, Accel is bactericidal, virucidal, and fungicidal, and ideal for use in controlled environments. Utilizing Accelerated Hydrogen Peroxide (AHP) technology – a synergistic blend of commonly used, safe ingredients that, when combined with low levels of hydrogen peroxide, dramatically increase its germicidal potency and cleaning performance. Accel is available in 1, 5, and 55 gallon containers, and is effective against a broad spectrum of pathogens in only five minutes!

Visit [vwr.com](http://vwr.com), (search word: Accel TB), to learn more about AHP and Accel Disinfectants. Contact your VWR Sales Representative to request an evaluation sample today!



Accel Concentrate	Cat. No.	Price
3.8L (1gal.)	89176-664	Cs. 4/ 215.69
18.9L (5gal.)	89194-376	Ea./ 231.25
208.2L (55gal.)	89194-378	Ea./ 2,291.66

# Berkshire Cleanroom and Critical Environment Solutions

## Documentation System

Paper and notebooks can be a major source of particles, bacteria, and micro-organisms in the cleanroom. Berkshire's documentation system is made with the purest quality cellulose from specially selected forests, and is specially coated to minimize particle and fiber release.



White Plain Paper	W x L, mm	Cat. No.	Pack of	Case of
<b>8.5 x 11 in.</b>				
Heavy Weight (104g/m <sup>2</sup> )	216 x 279	<b>77788-036</b>	250/ 34.50	10/ 267.18
Medium Weight (85g/m <sup>2</sup> )	216 x 279	<b>77788-006</b>	250/ 34.06	10/ 245.38
Light Weight (68g/m <sup>2</sup> )	216 x 279	<b>77788-038</b>	500/ 47.35	8/ 318.56

*Note: Also available in blue, pink, and yellow*

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Lab-Tips Swabs are suitable for cleanroom and controlled environments in applications such as precision cleaning, surface sampling, and validation procedures.

Berkshire offers an extensive range of high quality cleanroom laundered double layer polyester knit, cleanroom laundered foam, and nonwoven materials from which to choose.



Description	Cat. No.	Pack of 100	Case of
<b>Laundered Knitted Polyester Swabs*</b>			
Flex Tip	<b>89137-162</b>	<b>10.07</b>	20/ 201.48
Flex Tip, Double Layer	<b>89137-172</b>	<b>21.90</b>	10/ 218.95
Rigid Tip	<b>89137-164</b>	<b>10.07</b>	20/ 201.04
Rigid Tip, Double Layer	<b>89137-176</b>	<b>30.55</b>	5/ 152.76
<b>Cleanroom Laundered Foam Swabs†</b>			
Flex Tip, Long Handle	<b>89137-168</b>	<b>14.30</b>	10/ 143.05
Flex Tip, Small Handle	<b>89137-156</b>	<b>9.15</b>	20/ 182.93
Point	<b>89137-160</b>	<b>12.09</b>	20/ 241.81
Rigid Tip	<b>89137-158</b>	<b>8.92</b>	20/ 178.40
<b>Closed Cell Foam Swabs•</b>			
Rigid Tip	<b>89137-174</b>	<b>20.91</b>	5/ 104.55
<b>Nonwoven 100% Polyester Swabs</b>			
Flex tip	<b>89137-166</b>	<b>9.72</b>	20/ 194.43
Flex tip, Hydroentangled	<b>89137-170</b>	<b>17.89</b>	10/ 178.92

\* Cleanroom laundered double layer 100% Polyester knit swab heads

† Cleanroom laundered 100ppi open-cell Polyurethane foam swab heads

• Hydroentangled 100% Polyester swab heads

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- Ambidextrous glove, size-colored cuff for easy stock control
- Regular size fits any hand up to size 9
- Half-finger gloves ideal for retaining maximum dexterity and fingertip sensitivity

Size	Cat. No.	Pack of 10 Pairs	Case of 200 Pairs
<b>Nylon Full-Finger Liners</b>			
Large*	<b>14444-320</b>	—	<b>317.64</b>
X-Large*	<b>14444-322</b>	—	<b>317.64</b>
<b>Nylon Half-Finger Liners</b>			
Small*	<b>14444-312</b>	—	<b>282.81</b>
Medium*	<b>14444-314</b>	—	<b>262.18</b>
<b>Polyester Half-Finger Liners</b>			
Regular	<b>32891-470</b>	<b>26.28</b>	<b>371.81</b>
Large	<b>32891-472</b>	<b>25.25</b>	<b>357.25</b>
<b>Polyester Full-Finger Liners</b>			
Regular	<b>32891-474</b>	<b>29.13</b>	<b>411.73</b>
Large	<b>32891-476</b>	<b>27.91</b>	<b>393.38</b>

\*Bulk packed



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Foam, cotton, and foam-over-cotton



Swabs	Head, W x L, mm (in.)	Handle, W x L, mm (in.)	Swab Length, mm (in.)	Cat. No.	Pack of	Case of
<b>100ppi Open-Cell Polyurethane Foam Head and 100% Virgin Polypropylene Handle</b>						
Large, Rectangular	13.5 x 25.4 (0.531 x 0.999)	5 x 130 (0.195 x 5.100)	152.3 (5.996)	89031-286	500/ 154.72	2 Pks./ 281.27
Paddle-Shaped, Flexible	4.8 x 15.1 (0.188 x 0.594)	3.1 x 152 (0.120 x 5.995)	167.4 (6.591)	89031-276	500/ 116.70	2 Pks./ 212.19
<b>100ppi Polyurethane Foam Head and Wood Handle</b>						
Medium	4.8 x 17.4 (0.188 x 0.687)	2.5 x 152 (0.100 x 5.974)	166.7 (6.563)	89031-274	500/ 105.08	2 Pks./ 190.90
<b>Reticulated Foam Head and Extra-Rigid, Glass-Filled Polypropylene Handle</b>						
Cone-Shaped	3.9 x 17.5 (0.154 x 0.688)	2.5 x 83 (0.100 x 3.260)	100.3 (3.949)	89031-282	500/ 76.38	2 Pks./ 138.86
Extended Length	3.6 x 25.4 (0.140 x 1.000)	2.5 x 82.8 (0.100 x 3.260)	108.2 (4.260)	89031-284	500/ 163.98	2 Pks./ 299.24
Fine Point	1.8 x 14.6 (0.070 x 0.574)	2.4 x 161 (0.094 x 6.324)	174.5 (6.870)	89031-294	500/ 164.13	2 Pks./ 298.19
<b>Two Lintless Cotton Tips and Paper Stem</b>						
Double	4.4 x 15 (0.173 x 0.591)	2.5 x 78 (0.100 x 3.071)	93.0 (3.661)	89031-290	—	2,500/ 164.52
Double, Slim	3.2 x 14 (0.126 x 0.551)	1.5 x 75.5 (0.059 x 2.972)	89.5 (3.524)	89031-292	—	2,500/ 124.93
Double, Cone-Shaped	4.7 x 11 (0.185 x 0.433)	2.5 x 82 (0.100 x 3.228)	93.0 (3.661)	89031-288	—	1,250/ 83.69
<b>Cotton Tip and Wood Stem</b>						
Small	4.8 x 15.9 (0.188 x 0.624)	2.5 x 152 (0.100 x 6.000)	162.9 (6.413)	89031-270	1,000/ 20.25	10 Pks./ 164.55
Large	5.9 x 17.4 (0.234 x 0.687)	2.5 x 152 (0.100 x 5.995)	164.5 (6.476)	89031-272	500/ 11.70	10 Pks./ 89.70

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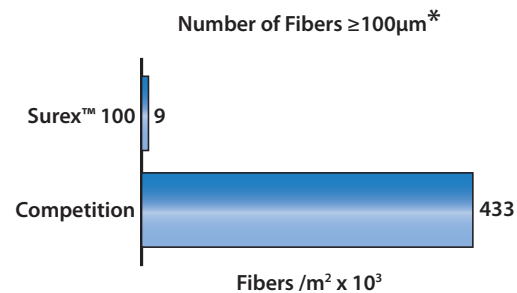
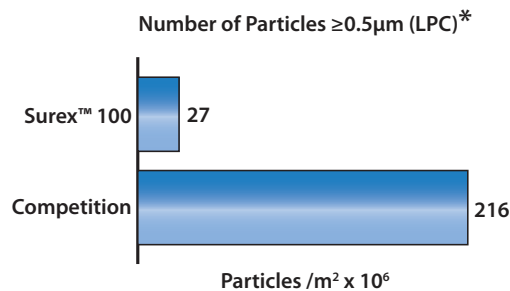
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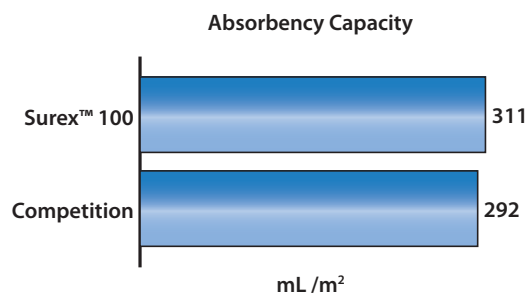


### Surex Performance

✓ **Extremely low particles and fibers compared to similar wipers in its class**

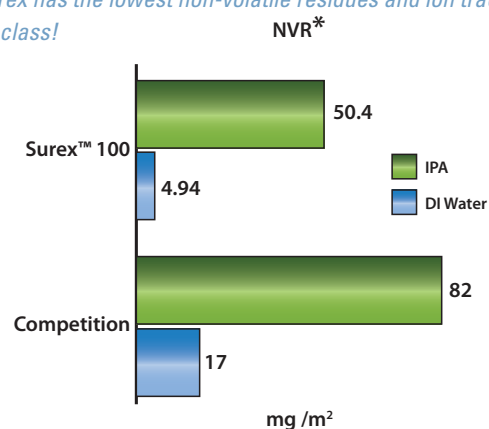


✓ **Versatile usage, soft and absorbent**



✓ **Maintains your cleanroom environment**

*Surex has the lowest non-volatile residues and ion traces in its class!*



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- **Reduce Your Working Capital**—Next day service into virtually every major market in North America & Puerto Rico minimizes your need for on-hand inventory.



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- **Streamline Existing Processes**—VWR has a team of Business Process Consultants available to assess your "order-to-cash" process as well as your on-hand inventory requirements.
- **Optimize Your Inventory**—Customized consignment and vendor managed inventory solutions allow you to optimize your on-hand inventory and reduce working capital.
- **Secure Your Supply Chain**—Integrate your operations directly into VWR's operational infrastructure to maintain supply chain security.

