

# CaviCide1™ & CaviWipes1™

THE NEXT GENERATION IN SURFACE DISINFECTANTS



**Metrex**

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## ***Introducing the Next Generation Multi-Purpose, 1 Minute Surface Disinfectant/Decontaminant Cleaners: CaviCide1™ and CaviWipes1™***

Metrex® is pleased to announce the launch of our new, next generation family of surface disinfectants, CaviCide1 and CaviWipes1. These new products represent the culmination of years of extensive customer and laboratory research, and are designed to clean and disinfect hard, non-porous surfaces in the clinical environment.

### ***CaviCide1 and CaviWipes1 offer the following features:***

- a) 1 minute contact time*
- b) 1-step cleaning and disinfecting*
- c) Low alcohol formula (22.5%)*
- d) Good materials compatibility*
- e) Conveniently packaged*

CaviCide1 and CaviWipes1 are multi-purpose, 1-step disinfectant/decontaminant cleaners, and offer a broad spectrum of organism kill in only 1 minute at room temperature for more than 20 clinically relevant organisms including: TB (*Mycobacterium tuberculosis* var: *bovis* [BCG]), Multi-Drug Resistant (MDR) *Acinetobacter baumannii*, ESBL *Escherichia coli*, *Klebsiella pneumoniae*, MRSA, and *Candida albicans*. CaviWipes1 contains durable, nonwoven, nonabrasive wipes presaturated with CaviCide1 surface disinfectant cleaner.

## ***Evolution of the Metrex CaviCide®/CaviWipes® Product Family***

Over the past two decades, Metrex has been providing high quality surface disinfectants, CaviCide and CaviWipes, to more than 220,000 healthcare facilities in the United States and Canada (Figure 1).

- During the mid-1990's, Metrex launched its flagship product, CaviCide, which is a ready-to-use, EPA registered hard surface disinfectant in the US and intermediate-level disinfectant in Canada designed to clean and disinfect hard, non-porous surfaces in the clinical environment.
- In 2001, Metrex expanded its surface disinfection product portfolio by launching its CaviWipes brand disinfecting towelettes. CaviWipes are durable, nonwoven, nonabrasive lint-free towelettes that are pre-saturated with CaviCide. CaviWipes are an EPA registered hard surface disinfectant in the US and intermediate-level disinfectant in Canada designed to clean and disinfect hard, non-porous surfaces in the clinical environment. Both CaviCide and CaviWipes are tuberculocidal, bactericidal, virucidal, and fungicidal.
- In 2008, Metrex launched a unique new packaging configuration, CaviWipes in a flat pack, which offers surface disinfection in a resealable soft pack with an adhesive backing, and is designed to adhere to mobile equipment (e.g., wheelchairs, COWs/WOWs, portable X-ray machines, etc.), nursing stations, personal protection equipment boxes, ambulances, admitting stations, home health bags, etc., and offers infection prevention where you need it the most – at your finger tips. CaviWipes flat packs offer environmentally friendly packaging that can help minimize downstream waste bulk and disposal costs (no plastic canisters to throw away). Additionally, CaviWipes in a flat pack require less storage and counter space than most conventional surface disinfectant wipe products.
- In 2012, Metrex proudly announces their new, next generation family of surface disinfectant products, CaviCide1 and CaviWipes1.

- CaviCide was initially launched with a 10 minute TB efficacy claim. Over the past few years, research and lab testing allowed Metrex to offer the additional key improvements to their surface disinfectant product line.
- 2001: (a) CaviCide received regulatory agency approval for a 5 minute TB claim; (b) CaviWipes was launched with a 5 minute TB claim
- 2007: Metrex received approval from the EPA and Health Canada for a 3 minute TB claim on both CaviCide and CaviWipes.
- 2012: Metrex receives approval from the EPA and Health Canada for a 1 minute TB claim on their next generation surface disinfectants, CaviCide1 and CaviWipes1.
- *Comments:*
  - *Evolution of efficacy contact times: 10 minutes → 5 minutes → 3 minutes → 1 minute TB claims*
  - Prior to the development of CaviCide1 and CaviWipes1, Metrex conducted extensive research to understand what the clinical community needed in terms of contact times, label claims and compatibility. Based on that research, the Metrex development team set out to develop a 1 minute surface disinfectant that is effective, offers materials compatibility, superior cleaning performance, and would help clinicians to improve compliance in their respective facilities.

*Figure 1: The Evolving Metrex Family of Surface Disinfectants*

## **Selecting a Surface Disinfectant**

Disinfection of contaminated surfaces continues to be a challenging aspect of infection prevention and ensuring patient safety. Selection of the right disinfection products to meet each facility's needs requires research, thoughtful consideration, and a level of trust.

- Typically, healthcare workers do not know what type of microbial contamination is present on the surfaces they are cleaning and disinfecting. Thus, when selecting a surface disinfectant for use in a clinical facility be sure to evaluate the product efficacy contact times and organism claims on the product label to make sure they will meet the institution's needs. This is an important point to consider when it comes to ensuring procedural compliance.
- ***If a surface disinfectant product label lists multiple kill times by organism, or has longer efficacy contact times, say 5-10 minutes, additional inservicing may be required to ensure the staff is adequately trained on the proper use of the product to be in compliance.***
- Make sure the manufacturing company that you partner with is both willing and able to provide you and your staff with (a) ongoing educational materials, wall charts and (b) inservicing to ensure the transition is seamless.
- In regards to addressing the need for having a level of trust that a product meets its label claims:
  - In the United States and Canada, before a surface disinfectant can be marketed and sold:
    - The formula must be subjected to rigorous laboratory testing using standardized protocols to demonstrate that it is efficacious against a selected group of microorganisms and meets

other indicated product performance claims.

- The laboratory test reports are then included as part of a submission package which is sent to the Environmental Protection Agency (EPA) and/or Health Canada for an in depth review by qualified examiners prior to being considered for approval.
- Finally, if after such rigorous scrutiny, these regulatory agencies are satisfied that the product performance claims have been fully demonstrated, approval to market and sell the product is granted.

### ***The Challenge: Following Labeled Instructions-for-Use vs. Faster Turnaround Time***

Currently, healthcare workers are faced with the challenge of complying with the need to follow manufacturer’s instructions for use on surface disinfection contact times (typically greater than 2-3 minutes). They balance this with the ever increasing needs for faster turnaround in their respective facilities. When challenged by ***The Joint Commission***, each facility must prepare a risk analysis document which addresses shorter contact times than stated on the labeled instructions for use. Many facilities indicate they are leveraging recommendations from key opinion leaders which indicate adequate surface disinfection can be achieved from one application and allowing the surface to dry within one minute due to the lower pathogen load in typical clinical environments than what is required for EPA antimicrobial testing procedures.<sup>1</sup>

Product performance test results for contact times are used as the basis for manufacturers’ developing instructions-for-use. Surface disinfectants indicate a contact temperature and time they are approved for on the product label. It is essential to abide by these parameters in order to achieve proper disinfection of a hard non-porous surface.

With the availability of the new 1 minute CaviCide1 and CaviWipes1, clinical workers can now follow labeled instructions for use and be in compliance with the regulations (Figures 2 and 3):

<b>1 Minute Contact Time</b>
<b>CaviCide1</b>
<b>TB</b>
<i>Mycobacterium tuberculosis</i> var: bovis (BCG) (TB)
<b>Bacteria</b>
<i>Acinetobacter baumannii</i>
<i>Multi-Drug Resistant (MDR) Acinetobacter baumannii</i>
<i>Bordetella pertussis</i>
ESBL <i>Escherichia coli</i>
<i>Klebsiella pneumoniae</i>
<i>Pseudomonas aeruginosa</i>
<i>Salmonella enterica</i>
<i>Staphylococcus aureus</i>
Methicillin Resistant <i>Staphylococcus aureus</i> (MRSA)
Methicillin Resistant <i>Staphylococcus epidermidis</i> (MRSE)
<i>Staphylococcus aureus</i> with reduced susceptibility to Vancomycin
Vancomycin Intermediate <i>Staphylococcus aureus</i> (VISA)
Vancomycin Resistant <i>Enterococcus faecalis</i> (VRE)
<b>Fungus/Yeast</b>
<i>Trichophyton mentagrophytes</i>
<i>Candida albicans</i>
<b>Viruses</b>
Hepatitis B Virus (HBV)
Hepatitis C Virus (HCV)
Herpes Simplex Virus Type 1
Herpes Simplex Virus Type 2
Human Immunodeficiency Virus (HIV-1)
Human Coronavirus (not associated with Severe Acute Respiratory Syndrome or SARS)
Influenza A, H3N2 Virus
Norovirus
Pandemic 2009 H1N1 Influenza A Virus
Rotavirus

Figure 2: CaviCide1 - One Minute Efficacy Claims

### **Overview of Chemical Agents Used in Hard, Non-porous Surface Disinfection**

There are several different types of antimicrobial agents that can be used to achieve hard non-porous surface disinfection. Agents may include (a) physical - e.g. heat or steam, (b) chemical or (c) a combination of both. The chemical agents can affect microorganisms through different mechanisms, such as disruption of the

<sup>1</sup> [http://www.cdc.gov/hicpac/pdf/guidelines/Disinfection\\_Nov\\_2008.pdf](http://www.cdc.gov/hicpac/pdf/guidelines/Disinfection_Nov_2008.pdf) page 31

bacterial cell wall and outer membranes. Other chemical agents function as chelators which prevent the organism from replicating.

Selection of surface disinfectant chemicals is a complex subject as one must take into consideration where the product will be used, what organisms are being targeted (e.g. *MRSA* or MDR *Acinetobacter baumannii*), the desired contact time (e.g. 1 minute versus 5 minutes), what surfaces will the product be used on (materials compatibility), and target temperature range for use.

Table 1 presents a summary of chemistry categories often used to develop surface disinfectant products.



<b>1 Minute Contact Time</b>	
<b>CaviWipes1</b>	
<b>TB</b>	
<i>Mycobacterium tuberculosis</i> var: bovis (BCG) (TB)	
<b>Other Bacteria</b>	
<i>Multi-Drug Resistant (MDR) Acinetobacter baumannii</i>	
<i>Bordetella pertussis</i>	
<i>ESBL Escherichia coli</i>	
<i>Klebsiella pneumoniae</i>	
<i>Pseudomonas aeruginosa</i>	
<i>Salmonella enterica</i>	
<i>Staphylococcus aureus</i>	
Methicillin Resistant <i>Staphylococcus aureus</i> (MRSA)	
Methicillin Resistant <i>Staphylococcus epidermidis</i> (MRSE)	
<i>Staphylococcus aureus</i> with reduced susceptibility to Vancomycin	
Vancomycin Intermediate <i>Staphylococcus aureus</i> (VISA)	
Vancomycin Resistant <i>Enterococcus faecalis</i> (VRE)	
<b>Fungus/Yeast</b>	
<i>Trichophyton mentagrophytes</i>	
<i>Candida albicans</i>	
<b>Viruses</b>	
Hepatitis B Virus (HBV)	
Hepatitis C Virus (HCV)	
Herpes Simplex Virus Type 1	
Herpes Simplex Virus Type 2	
Human Immunodeficiency Virus (HIV-1)	
Human Coronavirus (not associated with Severe Acute Respiratory Syndrome or SARS)	
Influenza A, H3N2 Virus	
Pandemic 2009 H1N1 Influenza A Virus	

Figure 3: CaviWipes1 - One Minute Efficacy Claims

<b>Chemistry Category</b>	<b>Example(s)</b>	<b>Activity</b>
<b>Surface-Active Agents (Surfactants)</b>	Quaternary Ammonium Compounds	The quaternary ammonium compounds are widely used as disinfectants. Membrane active agents. The bactericidal action of the quaternaries has been attributed to the inactivation of energy-producing enzymes, denaturation of essential cell proteins, and disruption of the cell membrane.
<b>Alcohols</b>	Ethyl Alcohol, Isopropyl Alcohol, <i>n</i> -propanol	Alcohols exhibit rapid broad-spectrum antimicrobial activity against vegetative bacteria (including <i>Mycobacteria</i> ), viruses, and fungi, but are not sporicidal.
<b>Halogen-Releasing Agents</b>	Sodium Hypochlorite (Bleach) Chlorine Dioxide	Chlorine- and iodine-based compounds are the most significant antimicrobial halogens used in the clinical environment and have been traditionally used for both antiseptic and disinfectant purposes. Halogen-releasing agents possess bactericidal and virucidal activities and at higher concentrations can be sporicidal.
<b>Oxidizers</b>	Hydrogen Peroxide	Hydrogen peroxide works by producing destructive hydroxyl free radicals which can attack vital microorganism cell components. Hydrogen peroxide is active against a wide range of microorganisms, including bacteria, yeasts, fungi, viruses, and spores.
	Peracetic Acid and Hydrogen Peroxide	The combination of peracetic acid and hydrogen peroxide can inactivate all microorganisms except bacterial spores in a short amount of time. At higher concentrations peracetic acid and hydrogen peroxide are sporicidal.
	Peracetic Acid, Peroxyacetic	Peracetic acid has rapid action against all microorganisms and enhances removal of organic material.
<b>Phenols</b>	Phenol	Phenolic-type antimicrobial agents have long been used for their antiseptic, disinfectant, or preservative properties. Phenols also have antifungal and antiviral properties.

Table 1: General Categories of Surface Disinfectants

## ***Cleaning Evaluation - A Comparative Overview of Surface Disinfectant Products***

A common belief is that surface cleaning and surface disinfection are synonymous. However, these two terms represent unique and independent functions in the clinical environment to prevent infectious cross contamination.

Cleaning represents the removal of visible soil contamination and gross debris consisting of such things as blood, mucous and other body fluids from environmental surfaces and fomites. Disinfection, on the other hand, is the process used to kill infectious organisms on these surfaces with the intent of preventing cross contamination.

- Generally, cleaning precedes disinfection as recommended by the CDC.
- Cleaning is mandated prior to disinfection in the presence of blood borne pathogens, such as: HIV-1, HBV, and HCV.
- In order to disinfect a surface, the solution must be in direct contact with the surface without interference from soils or visible gross debris.
- Soils encountered in clinical applications, such as blood and mucus, tend to have high concentrations of proteins and fats which can interfere with the surface disinfectant liquids by preventing contact with the surfaces which require disinfection. When this situation occurs, the surface is not fully wetted with the disinfectant, thus protecting the microorganisms from inactivation.
- Surface cleaners/disinfectants are available in ready-to-use sprays and pre-saturated wipes or concentrates (which require dilution prior to use) to meet the various clinical needs in a facility.
- The ideal surface cleaner/disinfectant would be able to satisfy the requirements of the end user (offer short efficacy contact times, superior cleaning, and convenient packaging) in order to facilitate compliance during inspections.

Some of these products have been tested in the presence of 5% soil, and are approved to offer a **1-step disinfection process** in which simultaneous cleaning and disinfection of a noncritical surface or item occurs.<sup>2</sup> Examples of where 1-step cleaning and disinfection may be used (assumes no visible gross debris or contamination from blood, mucous, or other body fluids are present) are shown as follows:

Fax Machines	Computers/keyboards/mouse	Workstations	Telephones
Hand Rails	Door Knobs	Wheelchairs	Stethoscopes
IV Poles	Bed Railings	Walkers	Blood Pressure Cuffs
Stretchers	Gurneys	Spine Back Boards	Defibrillators
Faucets	Physical Therapy (PT) Equipment Surfaces	Tables	Chairs

## ***Comparative Surface Disinfection Spray Cleaning Evaluation***

A comparative cleaning evaluation was conducted using Metrex's CaviCide1 and CaviCide versus a high alcohol (63.25%) competitive spray surface disinfectant product. In this trial, a blood-based fatty soil was affixed to stainless steel test coupons, allowed to dry and weighed. Next, these coupons were subjected to a standardized soil removal protocol and then were weighed again at the conclusion of the trial (Figure 4).

<sup>2</sup> [http://www.cdc.gov/hicpac/pdf/guidelines/Disinfection\\_Nov\\_2008.pdf](http://www.cdc.gov/hicpac/pdf/guidelines/Disinfection_Nov_2008.pdf) page 100

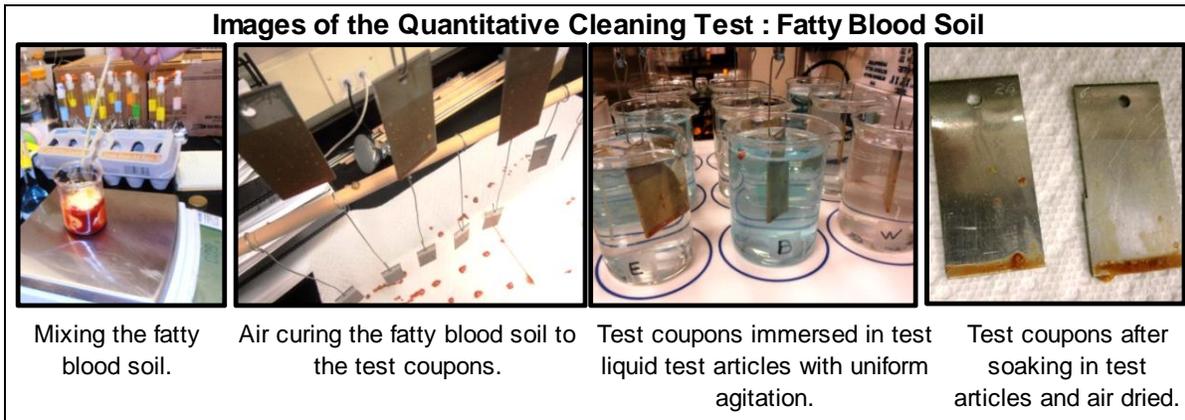


Figure 4: Surface Disinfection Spray Cleaning Evaluation

**Discussion of Results**

In this evaluation, CaviCide1 demonstrated (a) equivalent cleaning performance when tested against CaviCide; and (b) significantly better soil removal over that of the high alcohol spray product.

Note: The high alcohol product tested in this evaluation contains 63.25% isopropyl alcohol and appeared to bind soil to the test coupons, thus not effectively removing the blood-based soil during the cleaning study. It has been previously reported in literature that high alcohol concentrations bind proteins to surfaces.<sup>3</sup> This effect was also observed in the pre-saturated wipes cleaning evaluation (see discussion below).

**Comparative Surface Disinfection Wipes Cleaning Evaluation**

A comparative cleaning evaluation was conducted using Metrex’s CaviWipes1 and CaviWipes versus four competitive brands of surface disinfectant wipes.

Side-by-side comparative trials (using CaviWipes as the reference) were conducted using weighted test “sleds” to control variables such as pressure, texture and wipe area on glazed tiles (Figure 5). These tiles were coated with pre-dosed amounts of clotting whole blood. Two sleds were pushed in parallel across the soiled tile surface using a pneumatic linear actuator cylinder to remove the human variability from the process.

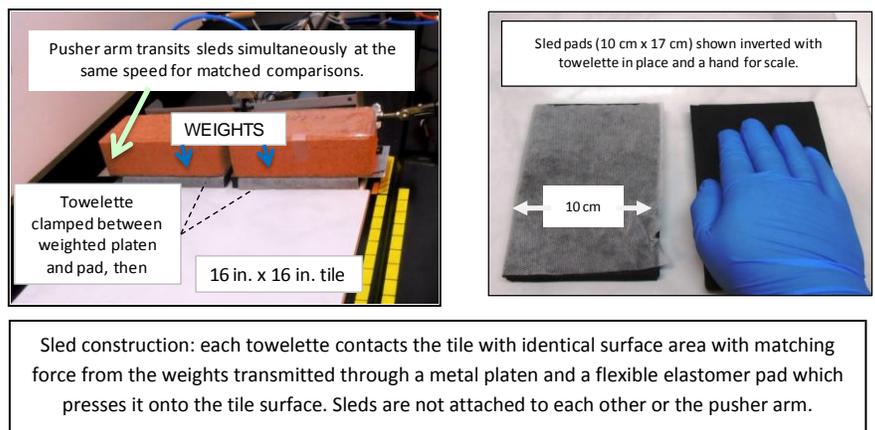


Figure 5: Surface Disinfection Wipes Evaluation Test Platform

<sup>3</sup> Prior, A., et al. Alcoholic fixation of blood to surgical instruments-a possible factor in the surgical transmission of CJD? *J Hosp Infection* 58 78-80 (2004)

Before Wiping Tile	After One Wipe	Paired Test Wipe Products	
		CaviWipes 1 Low alcohol (22.5%) + quat	GOOD
		CaviWipes (Reference) Low alcohol (17.2%) + quat	GOOD
		CaviWipes 1 Low alcohol (22.5%) + quat	GOOD
		Wipe Product A High alcohol (63.25%) + quat	POOR
		CaviWipes 1 Low alcohol (22.5%) + quat	GOOD
		Wipe Product B High alcohol (55.0%) + quat	POOR
		CaviWipes 1 Low alcohol (22.5%) + quat	GOOD
		Wipe Product C Intermediate alcohol (41.6%) + quat	POOR
		CaviWipes 1 Low alcohol (22.5%) + quat	GOOD
		Wipe Product D Hydrogen peroxide (0.5%)	GOOD

Legend:	
Wipes Product	Product Chemistry
A	High alcohol (63.25%) + quat
B	High alcohol (55.0%) + quat
C	Intermediate alcohol (41.6%) + quat
D	Hydrogen peroxide (0.5%)

Figure 6: Results from Surface Disinfection Wipes Cleaning Evaluation

## Discussion of Results

- CaviWipes1 was judged to offer superior cleaning performance in this evaluation over those of both the high alcohol wipe products and the intermediate level alcohol wipe products tested (Figure 6).
  - When higher alcohol (>50%) surface disinfectant products come into contact with blood soil, they do not remove the blood soil from the test surfaces. These observations suggest that this binding may occur across a variety of materials, even when manufactured with smooth surfaces, consistent with previously published literature.<sup>4</sup>
- CaviWipes1 consistently cleaned and removed the clotting blood soil in each experiment and demonstrated equivalent cleaning performance to both: (a) the reference product, CaviWipes, and (b) the hydrogen peroxide wipes product tested.

<sup>4</sup> Prior, A., et al. Alcoholic fixation of blood to surgical instruments—a possible factor in the surgical transmission of CJD? *J Hosp Infection* 58 78-80 (2004)

## Overview of Compatibility Testing

CaviCide 1 solution was tested and found to be compatible with the materials shown below. Materials were exposed to 14 days (336 hours) of continuous contact with CaviCide 1 with no effect unless otherwise noted. This contact time equates to 20,160 applications of CaviCide 1 based on the product contact time.

CaviCide1 and CaviWipes1 are classified as low alcohol (22.5%) surface disinfectants and offer materials compatibility with the following materials in Figure 7 shown below:

<b>CaviCide1 and CaviWipes1 Compatibility</b>	
CaviCide1 and CaviWipes1 are compatible with the following materials:	
Acrylic	Naugahyde
Polystyrene	Formica (white)
PVC	Formica (black)
Neoprene <sup>1</sup>	Brass <sup>2</sup>
Polypropylene	Glass <sup>3</sup>
High density polyethylene (HDPE)	Copper <sup>4</sup>
Epoxy counter tops	Stainless Steel
Silicone	Chrome Plated Brass
EPO TEK 353	

*Figure 7: Overview of CaviCide1 and CaviWipes1 Materials Compatibility*

**Notes:**

- <sup>1</sup> slight darkening when compared to control
- <sup>2</sup> slight lightening when compared to control
- <sup>3</sup> areas of spotting observed
- <sup>4</sup> areas of discoloration

## Comparative Surface Disinfection Compatibility Evaluation

In addition to evaluating CaviCide and CaviCide1, several competitive products were included in the study. This included (a) a low pH 0.5% hydrogen peroxide spray, (b) 0.65% bleach spray, and (c) a 62% high alcohol spray product. The results are presented in Table 2 below where green represents compatibility with a test surface and red indicates a lack of compatibility with the test surface.

- CaviCide1 and CaviCide offer superior materials compatibility as compared to that demonstrated by (a) the low pH 0.5% hydrogen peroxide spray, (b) the 0.65% bleach spray and the (c) 62% high alcohol spray products when tested against the surfaces indicated in Table 2.

Test Surface	Compatibility Summary				
	CaviCide Low Alcohol (17.2%)	CaviCide1 Low Alcohol (22.5%)	Low pH Hydrogen Peroxide (0.5%) Product Spray	0.65% Bleach Product Spray	High Alcohol (62%) Product Spray
Acrylic	Green	Green	Red	Red	Red
Polystyrene	Green	Green	Green	Red	Red
PVC	Green	Green	Green	Green	Red
Neoprene	Red	Green	Red	Red	Red
Kraton G	Green	Red	Green	Red	Green
Silicone	Green	Green	Green	Red	Green
EPO TEK 353	Green	Green	Red	Green	Green
Naugahyde	Green	Green	Green	Red	Red
Formica (white)	Green	Green	Green	Red	Red
Formica (black)	Green	Green	Green	Red	Red
Aluminum	Red	Red	Red	Red	Red
Brass	Red	Green	Red	Red	Red
Carbon Steel	Red	Red	Red	Red	Red
Chrome Plated Brass	Green	Green	Red	Red	Red
Copper	Red	Green	Red	Red	Red
Nickel Plated Brass	Green	Red	Red	Red	Green
Stainless Steel	Green	Green	Green	Red	Red
Glass	Green	Green	Green	Green	Red

Legend	
	Indicates product compatible with test surface

Table 2: Overview of Competitive Surface Disinfectant Product Materials Compatibility

## Conclusions

The prevention of health care associated infections (HAIs) is top of mind for clinicians around the globe. Infection Preventionists are working diligently to make sure their organizations have standardized policies and procedures in place, and are working to drive compliance through educational seminars/in-servicing and visual reminders such as wall charts and other signage.

When selecting a surface disinfectant for use in a facility:

- Evaluate the product contact times and organism efficacy claims on the product label to make sure they will meet the institution’s needs. This is an important point to consider when it comes to ensuring procedural compliance.
- Select a trusted surface disinfectant manufacturing partner who will provide you and your staff with the technical support and education required to ensure the transition is seamless.

CaviCide1 and CaviWipes1 are low alcohol, multi-purpose, 1-step disinfectant/decontaminant cleaners which offer materials compatibility, superior cleaning, and a broad spectrum of organism kill in only 1 minute at room temperature. CaviCide1 and CaviWipes1 are conveniently packaged (spray and wipes) and the Metrex Sales Consultants will provide inservicing and educational materials to ensure staff have the support they need to drive compliance within the facility.

To learn more about Metrex and CaviCide1™, including how to get a sample of this new product, go to [metrex.com/cavicide1](http://metrex.com/cavicide1) or scan the QR code with your smartphone.



***For more information:***

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