

SPARTAN CHEMICAL :: WHITE PAPER

October 1, 2020

UNDERSTANDING HARD SURFACE DISINFECTION IN INDUSTRIAL AND INSTITUTIONAL APPLICATIONS

With the COVID-19 pandemic driving increased use of disinfectants in industrial and institutional facilities, it is important to gain a deeper understanding of cleaning and disinfection and the roles they play in keeping our businesses and workplaces safe.

This paper provides an overview of disinfectants and their role in a managed cleaning program, including how the consideration of environment and pathogens needs to be addressed in product selection. The paper also discusses the importance of using products as directed, and the necessity of following safety data sheets, product labels, and regulatory guidance in establishing and maintaining a cleaning program that keeps cleaning staff and building residents safe. Every successfully structured cleaning and disinfecting program should also include ongoing training, as well as a system to document and manage cleaning operations and validate that proper cleaning procedures have been followed. *Note: This paper does not cover food production sanitation.*

DEFINING CLEANING AND DISINFECTION

Disinfectants play a critical role in public health, helping to reduce the risk of infection. When used as part of a managed cleaning program, disinfectants kill harmful pathogens on surfaces, preventing their spread through human contact

Cleaning and disinfecting each play an essential role in keeping buildings and facilities safe.

The Centers for Disease Control (CDC) defines cleaning and disinfecting as follows:

- **Cleaning:** Refers to the removal of dirt and impurities, including germs from surfaces. Cleaning alone does not kill the germs. But by removing some of the germs, it decreases their number and therefore reduces the risk of spreading infection.
- **Disinfecting:** Works by using chemicals, for example, Environmental Protection Agency (EPA) registered disinfectants, to kill pathogens on surfaces. This process does not necessarily clean dirty surfaces or remove germs, but killing germs remaining on a surface after cleaning further reduces any risk of spreading infection.

The best practice, especially during an outbreak or pandemic, is to utilize both cleaning and disinfection as part of the routine process. The soiled surface is first cleaned with the appropriate cleaner for the soil load. Chemical disinfectants are then applied to eliminate the remaining pathogens; chemical disinfectants are more effective at killing pathogens if surfaces have first been cleaned to remove dirt and other soils. One-step cleaner disinfectants are an option and do help to reduce time to clean. However, keep in mind that while these products offer 100% kill of named organisms, they may not remove all the soil on the surface.

COVID-19 Highlight

The [EPA has published a list of approved products for use against COVID-19](#) to help determine the most appropriate disinfectant for the surface, object or environment in question, as different active ingredients are targeted for different applications.

Selecting the Right Disinfectant

There is not a single silver bullet for all situations. Selecting the proper disinfectant for the job requires knowledge of the environment and types of pathogens to be addressed.

[The CDC publishes guidance](#) on how to create and maintain safe and healthy workplaces and other community facilities in a variety of situations and environments. The requirements for cleaning and disinfecting a school classroom will be different than those for cleaning and disinfecting a patient room in a long-term care facility, for instance. In addition, within each of these settings there may be different circumstances that require different cleaning procedures. Disinfection protocols used in hospital settings are not required and should not be used for public facilities. Hospitals have specific environments and situations such as patients with communicable diseases or operating rooms which mandate higher level disinfection practices and personal protective equipment (PPE). For most public settings, basic cleaning and disinfecting is appropriate to manage the spread of harmful pathogens and provides a safe environment for facility occupants.

Level of Kill

To make sure that a hard surface is safe to use or be in contact with, it is necessary to understand the level of safety needed: What level of kill is required? Should the surface be sanitized, disinfected, or sterilized?

- **Sanitize.** To sanitize means to reduce the pathogens to a safe level, which is generally recognized as a reduction of 99.9%. When sanitizing non-porous surfaces, there are two general categories of surfaces: Food contact surfaces and non-food contact surfaces. For sanitizers used on food contact surfaces, the sanitizer must remain wet on the surface for the contact time listed on the label and then be allowed to dry completely before the surface is considered safe for food contact. For non-food contact surfaces, the sanitizer simply needs to be left on the surface for the contact time listed on the label and be either wiped dry or allowed to air dry.
- **Disinfect.** Disinfection is the actual killing or inactivating of the pathogens on the surface. To disinfect means to eliminate 100% of what the product claims to kill on the product label. To work as directed, the disinfectant must remain wet on the surface for the entire dwell time listed on the label and requires a potable rinse before food contact.
- **Sterilize.** Sterilizing is the process of eliminating 100% of everything on a surface. Sterilization is commonly used for instruments and other items that contact non-intact skin such as scalpels and clamps used in the surgical process.

Dwell Time

Before using any disinfectant or sanitizer, it is imperative that users read and understand the use instructions on the label. One very important piece of information found on product labels is contact or dwell time, which is the required period that a surface must remain wet with the chemical sterilizer, disinfectant or sanitizer to ensure the product is effective against the pathogen or pathogens listed on the product label. Check the product label for dwell time requirements as this is specific to each product.

Environment

Perhaps the most important consideration in selecting a disinfectant is the environment. What is the pathogen that needs addressed? Is there an outbreak?

Disinfectant product labels list the organisms (bacteria, virus, etc.) that they are effective against. When selecting the right disinfectant, directors should match the product with the level of the environment. For example, in routine maintenance, a neutral one-step cleaner disinfectant is appropriate for daily programs. Many surfaces, infrequently touched, may be cleaned with detergents and don't require a disinfectant.

When the environment changes, say during flu season, a norovirus outbreak, or the COVID-19 pandemic, the level of risk increases and requires a different approach to ensure safety. Facilities should consider changes in the frequency of use, product selection and PPE applied.

Ready to Use or Concentrated

Other considerations when selecting sanitizers and disinfection products is the choice of purchasing the product in ready-to-use containers or in concentrate. Products in ready-to-use packaging provide superior convenience, worker safety and compliance, and deliver consistent and quality performance. Products in ready-to-use packages are prediluted, meaning fewer spills, less waste, and reduced training time. In addition, the prepackaged products come ready-labeled with all necessary specifications and are easy to distribute and inventory.

On the other hand, products diluted from concentrate are usually more cost-effective on a cost-per-use basis and generate less packaging waste.

MANAGING DISINFECTION PROTOCOLS

Different situations will require different disinfection processes and methodologies. Establishing levels and criteria is one way to approach a disinfection program. Depending on the facility and environment, directors can establish a set of guidelines that should be adhered to. For example, if there is a known pandemic, the product selection should accommodate the pathogens, cleaning frequency that a facility wishes to address. In the case of an outbreak, isolation protocols should be followed in addition to the appropriate product and disinfection frequency. A sample guideline is listed below (table A) and an example of Spartan Chemical Company products listed in Table B.

Table A: Disinfection Program Guidelines

Disinfection Protocol Level	Level of Kill	Environment	Frequency	Active
Green	Low	Routine	Daily	Bactericidal, Viricidal
Yellow	Low - Medium	Known Pandemic	More Frequent	Bactericidal, Viricidal, Tuberculocidal
Red	Medium - Difficult	Known Outbreak	High Frequency	Tuberculocidal, Sporocidal

Table B: Example Spartan Chemical Program

Disinfection Protocol						
Level	Level of Kill	Environment	Frequency	Active	Concentrate	RTU
Green	No known issues	Routine	Daily	Broad Spectrum Quaternary Ammonium	X-EFFECT®, Clean by 4D, hdq C®2	Hepacide Quat®, NABC®
Yellow	COVID-19 pandemic, Flu season	Known Pandemic	More Frequent	Bactericidal, Viricidal, Tuberculocidal	BNC-15®, Halt®	TB-Cide Quat®
Red	Norovirus Outbreak, C. Diff Outbreak	Known Outbreak	High Frequency	Sporicidal, Tuberculocidal	BNC-15®	Diffense®

Addressing High Touch Surfaces

Even with the best hand hygiene practices, contaminated surfaces can expose hands to potential pathogens, which can be transmitted to other surfaces and people.

Therefore, it is critical to pay extra attention to high-touch surfaces in buildings such as door handles, sink handles, countertops, light switches, and phone/keyboards. Modifying standard procedures to accommodate more frequent cleaning and disinfection in a Yellow or Red environment level can reduce the risk of spreading infection by reducing and killing germs on surfaces people frequently touch.

Personal Protective Equipment (PPE)

Environment also has an impact on PPE. Many products may not require PPE based on HMIS ratings or OSHA GHS guidance; however, cleaning staff also need to consider the environment when making decisions about PPE. When cleaning for a harmful pathogen, PPE is required regardless of the cleaner/ disinfectant’s health rating. For example, when cleaning up bodily fluids, PPE should be worn even if the staff is using water to remove the gross soils.

UNDERSTANDING REGULATION AND DOCUMENTATION

Understanding safety documentation and regulatory guidance is essential for selecting appropriate products and establishing a comprehensive managed cleaning program.

Multiple separate government agencies are responsible for different aspects of the regulations surrounding the use of chemical sanitizers, disinfectants, and sterilizers.

The **Occupational Safety and Health Association** (OSHA) is the federal agency that oversees workplace safety rules. OSHA is the agency that requires employers to have safety data sheets (SDSs), proper labels for non-pesticide products, related training, and PPE (Personal Protective Equipment). It is the sole responsibility and liability of the employer to determine appropriate PPE requirements in the context of how they intend their employees to use the product.

The **Department of Transportation** (DOT) oversees the shipping and transport of disinfectants. The DOT may require a company to list a product or product size as hazardous, most commonly for materials that are flammable or corrosive.

The **Environmental Protection Agency** (EPA) oversees all aspects of testing, registering, labeling, and marketing of surface sanitizers, disinfectants, and sterilizers. This includes what is allowed on the label and the information that is used on the related marketing materials. Remember, the label is the guide. If the label directions for use do not show an application such as spray, immersion, or fogging, then that type of application is not appropriate. For safety purposes the EPA uses its own safety language key words; they are listed here from safest to most harmful: Caution, Warning, Danger, and Danger Poison.

The **Centers for Disease Control** (CDC) does not regulate any cleaning and disinfection products. Their primary role in this area is to provide guidance on how and where to use the registered tools the other agencies regulate. They publish information about emerging or ongoing health issues and provide guidelines on how to clean, disinfect and validate the processes for specific types of facilities.

Use instructions provide clear guidance on the organism killed by a product and required dwell time for 100% kill. They also include hazard identification and warnings, along with hazard statements and precautions. It's critical to strictly follow the cleaning instructions for all products, including dilution directions to ensure that the product is potent enough for efficacy (so that it kills the organism) but safe for staff to apply when precautions are observed. It is also imperative that disinfectant products are never mixed.

SDSs and safety summary sheets include information such as the properties of each chemical; the physical, health and environmental health hazards; protective measures; and safety precautions for handling, storing and transporting the chemical. Employers must ensure that SDSs are readily accessible to employees for all hazardous chemicals in their workplace.

The product label also provides recommendations for personal protective equipment (PPE), such as appropriate types of eye, face, skin or respiratory protection, to prevent illness or injury from exposure to chemicals.

User-prepared solution labels provide safety information and product identification for in-use dilutions. Properly labeled containers are required by OSHA and EPA. Adhesive user-prepared solution labels can be applied to any applicator including a spray bottle, pump-up sprayer, bucket or similar. Labels are color-coded to match the product's primary label.

TRAINING AND DOCUMENTATION

Every managed cleaning program should also include ongoing staff training and education to ensure that proper cleaning procedures are both understood and followed. And, cleaning management software can automate tracking of cleaning operations and validate that proper cleaning and disinfecting processes were observed.

Training is essential for new employees and should remain available for existing staff to help ensure that custodial workers understand and master the proper cleaning procedures to promote a safe and clean environment and maintain workplace safety compliance. OSHA requires employers to train employees on the GHS Hazard Communication Standard 29 CFR 1910.1200, which demonstrates safe handling and use of safety information for professional cleaners and disinfectants. Employees that come in contact with bodily fluids are required

to be trained on the OSHA Blood Borne Pathogen Standard 29 CFR 1910.1030 which protects workers from occupational exposures and proper procedures for exposure to blood or other potentially infectious materials. Beyond safety training, trained workers are more efficient and get better results.

In addition, cleaning management software provides tracking and documentation of day-to-day cleaning and disinfecting. A good software package should include a variety of functions to improve quality assurance, inventory management, workload scheduling and documentation of facility cleaning operations. Mobile app capability offers convenience to workers on the go, allowing cleaning staff to perform quality inspections and report in real-time where the cleaning took place, who performed it, and what type of service was performed. Tracking and documenting cleaning operations not only validates that the job has been done correctly, but it also allows supervisors to target potential reoccurring trouble spots and implement process improvement and retraining as needed.

Conclusion

Proper cleaning and disinfecting as part of a managed cleaning program is the most effective weapon against the spread of pathogens and disease. Developing a deeper understanding of cleaning and disinfection and the role they play in keeping our facilities and businesses safe is critical for the health and safety of both cleaning staff and building occupants.

Spartan prides itself on offering end-to-end cleaning solutions for all industrial cleaning needs. For more than 60 years, Spartan has set the industry standard of excellence with unparalleled cleaning solutions, including a broad spectrum of disinfectants and cleaning products, custodial management software and apps, and employee training programs.



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