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Employers Guide to COVID-19 Cleaning and Disinfection in Non-Healthcare Workplaces

Guidance Document

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Sponsored by the AIHA Indoor Environmental Quality Committee

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Introduction

As companies return to work in office buildings, retail centers, and other public places employers must take steps to reduce the risk of employees and customers contracting COVID-19 (for simplicity, this document will usually refer to the SARS-CoV-2 virus simply as “the virus”, and the disease as “COVID”). Health officials have reported that many people infected with the virus, even if they never develop symptoms, can spread the disease. Airborne viral particles are produced when infected people cough, sneeze, sing, or even when they speak or just breathe. People who inhale these viral particles may contract COVID. This airborne route of exposure is widely regarded to present the greatest risk of infection. Guidance for employers to reduce inhalation exposure should include administrative controls (e.g. *physical distancing measures, frequent hand-washing, working from home, and physical separation*); engineering controls (i.e. *physical barriers, enhanced ventilation, and air filtering devices*); and wearing necessary personal protective equipment (PPE) (e.g. N95 or other respirators, disposable gloves, and eye protection).

People can also contract the virus by touching contaminated surfaces and then touching their eyes, nose or mouth. Contact exposures are believed to be secondary to inhalation exposures but should be part of control measures to prevent infection. Surfaces become contaminated when droplets from an infected person’s breath, cough or sneeze land on an indoor surface. To reduce the risk of exposure from contaminated surfaces employers can implement a cleaning and disinfection program, the subject of this guidance from the American Industrial Hygiene Association (AIHA). Before the COVID-19 Pandemic cleaning and disinfecting programs to reduce the spread of infections were not commonplace outside of healthcare and long-term care facilities. Establishing enhanced routine cleaning and disinfection procedures in offices, factories, distribution warehouses, call centers, pharmacies, grocery stores, and other non-healthcare workplaces is a critical step in reducing exposures and the risk of infection. AIHA has developed a companion guidance document for Custodians, Cleaning and Maintenance Staff that provides more detailed information on this subject.

1. DEVELOP A PLAN

To minimize the risk of transmitting the virus through contact on surfaces, employers should develop and implement a sustainable plan for robust cleaning and disinfection of surfaces in their buildings, with the goal of infection prevention.

1.1 Assess your existing cleaning program

The first step in creating a cleaning and disinfection plan is to assess and document the existing cleaning activities throughout each building. If you occupy a multi-tenant building, where employees use elevators or walk through common areas of the building not under your control, then the program should be coordinated with building management and other tenants.

To assess current cleaning activities, determine the frequency and methods of cleaning, as well as the products used for cleaning each type of surface in the workplace and common areas. The various types of surfaces, which can require specific cleaning and/or disinfection protocols, are detailed later in this document. For each area, document the surface type(s) being cleaned and who is responsible for cleaning them, such as the janitorial staff, an outside janitorial contractor, building management, or the person who occupies or uses the desk, equipment, or office.



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1.2 Inventory high-touch surfaces

The second step is to walk through the workplace and common areas and inventory the types of surfaces that are likely to be touched during a workday by multiple employees, contractors, customers, or guests. During the walkthrough, estimate the number of people who typically use or walk through each area. Surfaces in common areas that are touched by multiple people per shift are likely touched more frequently. Note on the inventory if these surfaces have rough, textured surfaces or have cracks and crevices that are more difficult to clean. Examples of surfaces that are typically touched by one or more persons are provided below.

Common Areas

Common areas include reception areas, lounges, breakrooms, lunchrooms, cafeterias, conference rooms, locker rooms, hallways, and other locations where multiple employees may gather, other than their designated work space.

Reception Areas

- Door handles
- Chairs/tables
- Doorbell/call bell
- Phone
- Sign-in pen



Breakroom/Cafeteria/Lunchroom

- Refrigerator doors
- Microwave doors and keypads
- Vending machine keypads and item swing doors
- Coffee pot handles, Keurig (K-cup) lid handle and setting buttons
- Water dispenser buttons
- Ice machines (scoops, tongs, etc.)
- Self-serve soda/condiments/creamers etc. dispenser buttons or pump handles, napkin holders
- Entry/exit door handles
- Common-use serving utensils
- Employee timeclocks
- Shared/common computers

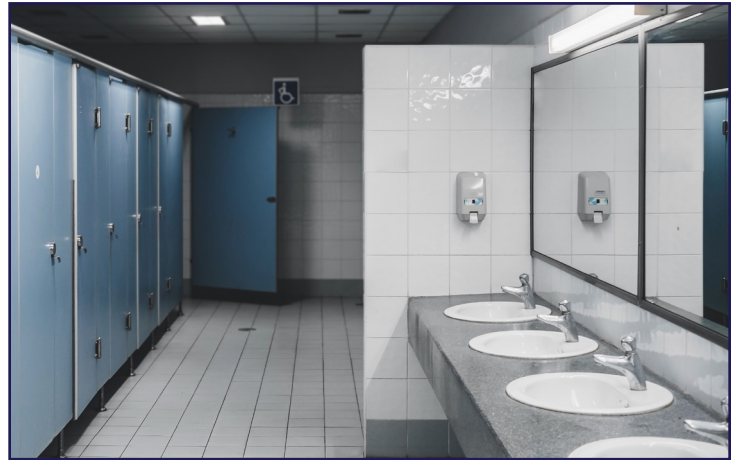


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Bathrooms

- Paper towel dispenser handle
- Toilet paper holder opening
- Stall door handles
- Flushometer handles/buttons
- Sink faucet hot/cold knobs
- Door handles
- Bathroom stall handles and doors
- Light switches



Conference Rooms

- Keyboard/mouse/laser pointer
- Podium surface
- Shared laptop keypad
- Projector adjustment keypad/remote
- Chair arms and height adjustment
- Conference tabletop
- Door handles/light controls/microphone and or wireless headsets
- Conference phone controls



Building Lobbies, Elevators, Escalators and Entryway

- Elevator call buttons
- Elevator cab floor buttons
- Internal handrails
- Escalator handrails
- Revolving door and standard door handles
- High touch handrails
- High touch lobby/waiting area chairs, couches, desks
- Call buttons, phones, and touchscreens



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Employee Workspaces

Employee workspaces are areas where employees spend a significant amount of their work hours. They can include offices, assembly lines, work benches, warehouses, cubicles, operation control centers, call centers, and server/computer locations. Often these areas have specialized equipment and high-contact touchpoints may not be obvious. It is important to speak directly with employees and managers in these areas to identify important touchpoints.

Offices/Cubicles/Call Centers

- Keyboards/mice
- Light switches
- Door handles
- On/off buttons for computers and monitors
- Window/window shade handles
- Thermostat controls
- Chair handles/desktops
- Phones handsets/headsets
- Employee timecard machines and time card holders
- Multifunctional photocopier touchpads
- Common use staplers, scissors, etc.
- Security keypads
- Drinking water dispenser buttons/fountains



Warehouses

- Forklift controls/pallet jack handles
- Loading dock controls
- Barcode scanners
- Shared computer workstations
- Inventory printer keypads
- Commonly used door handles
- Staging area touchpoints
- High touch safety railings
- Common use phones/call buttons
- Garage door controls



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Assembly lines

- Employee station tools/robot controls/keypads
- High-touch surfaces within employee stations
- Inventory staging area high touch surfaces/equipment
- Line control switches/buttons
- High touch buttons/keys/knobs control centers
- High touch, common use tools/equipment
- Hopper lid handles
- Overline stair railings

**Machining/Fabrication**

- High-frequency common use tool handles
- Common use toolbox handles
- Machine on/off buttons, keypads, touchscreens
- Compressed gas valve controls
- Common use bench tops, vice handles, measuring devices

**Food Service**

- Common use ingredient storage containers
- Gas stove/grill knobs
- Order up bells
- Food preparation device handles and buttons
- High-frequency touch storage handles
- Refrigerator/freezer/oven/ice machine handles
- Order touchscreens/payment registers
- Common touch railings and door handles
- Seating touchpads and Host podium surfaces
- Prep area sink handles and faucet extension grips
- Dishwasher door handles and control buttons
- Bus tubs/boxes
- Cutting boards and knives
- Serving trays



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1.3 Minimize Contact with Multi-touch Surfaces

The third step is to review the inventory of multi-touch surfaces to determine which porous and nonporous multi-touch points can be eliminated, or contact reduced.

Porous Multi-touch Points

Porous materials (such as window coverings, cubical walls, and upholstered furniture) that are multi-touch points are particularly problematic. The problem is that microorganisms can penetrate some porous materials and evade disinfecting chemicals. Currently, there are no disinfectants deemed suitable for porous materials, except as a laundry pre-treatment. ([US EPA Table N, discussed later.](#))

Therefore, to the extent feasible, multi-touch porous surfaces should either be removed or covered with a cleanable, nonporous material (such as plastic), or procedures must be put in place to reduce or eliminate touching by multiple persons.

Porous surfaces can be either covered with a cleanable nonporous surface (such as plastic sheeting), a disposable covering (such as paper), or an easily removable fabric cover that can be laundered. There is ample room for innovation in eliminating this source of potential exposure.

Nonporous Multi-touch Points

Reducing the number of nonporous surfaces that are touched by multiple persons (and therefore require more frequent disinfection) is an opportunity for employers to be innovative in implementing engineering solutions, procedural changes, or personal barrier solutions. With all changes, consideration must be given to potential health and safety issues other than COVID, to ensure that changes do not introduce a greater risk than they protect against.

Engineering solutions: Similar to engineering controls used to reduce exposure to other workplace hazards, engineered solutions can work to eliminate multi-touch surfaces by completely removing or substituting touch points in favor of hands-free options. There are several technologies that can be used to foster a business's transition from multi-touch to touch-free spaces. Innovative engineering solutions to reduce number of commonly touch surfaces or the time that viruses remain infectious on a surface may be considered, but the reliability and safety of alternative engineering solutions must be considered.



One way to eliminate and replace multi-touch surfaces is with “no-touch”, sensor-based, electronic, and voice-powered technologies. Ideally, employees would be completely isolated from multi-touch surfaces and contact points through engineering solutions. Where these controls cannot be applied (or until they can



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be installed), solutions like installing personal barriers, or implementing procedural changes, can be used to minimize the potential for employee contact with the virus.

Smart devices and apps can be configured to switch lights and certain electronic devices and eliminate multi-touch points such as remote-control buttons, hand-activated light switches, and phone consoles. Alternatively, electronic devices and light fixtures may be able to be powered by foot or floor switches.

In restrooms, breakrooms, and kitchens, contact with multi-touch surfaces can be eliminated by automatic and sensor-based technologies, such as:

- Automatic flush toilets.
- Automatic sensor sink faucets, hand soap, and sanitizer dispensers.
- Touch-less paper towel dispensers (sensor-powered and/or manual). **NOTE:** the use of automatic hand dryers is **strongly** discouraged.
- Garbage cans with either no lid, or with foot pedals or motion sensor-powered openers.

Additional guidance for specific types of workplaces is available at AIHA's Back to Work Safely™ website at <https://www.backtoworksafely.org>.

Procedural changes: Post instructions for employees, visitors, and customers to avoid touching high contact surfaces. Examples include signs directing pedestrian traffic on a route that avoids doors with handles and reminding people to avoid touching certain surfaces. In some cases, interior doors can be removed or propped open for a touch-free walkway (check local fire codes before doing this, though). For doors with push-bars, employees should be instructed to use their hip, rather than their hands, to open the door.

Another procedural control is to eliminate food and beverage dispensers salt and pepper shakers, or table-top ketchup bottles. Where business permits, shared items can be eliminated, and employees directed to bring their own meals and snacks.

Personal barrier solutions: Barrier solutions include disposable keyboard covers or wearing disposable gloves. Like personal protective equipment (PPE), the effectiveness of personal barriers hinges on widespread and consistent use of the barriers.

Where direct contact with doorknobs, handles, and buttons at entrances, exits, and passage points is unavoidable, a container of hand sanitizer could be mounted near the door. Alternatively, a paper towel or tissue dispenser can be installed next to the door, and employees instructed to use the tissue or towel on the handle and dispose of it after use.

For buttons, such as at elevators and loading docks, physical barriers or tools that can be carried by each employee can be effective at eliminating high-touch surfaces. An example of this might be a small hex key that can be carried in an employee's pocket and used to touch multi-touch keypads and elevator buttons.



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Other barriers to consider would be single-use or chemically resistant gloves that can be disinfected, paper towels, or grasping cuffs can help minimize employee contact with multi-touch points on vehicles, such as forklifts, hand trucks, trolley carts, dollies, and utility and storage carts.

For multi-touch surfaces, such as protective railings and grip points, physical barriers to the surface may prevent a solid grip. If disposable gloves prevent a good grip, gloves with rubber-impregnated palms can be used to ensure a good grip.

In individual workspaces, it may be difficult to entirely eliminate keypads, phones, staplers, etc. In some cases, it would be cost-effective to purchase multiples of various tools and equipment; that is, one set being assigned to each employee. This would turn shared, multi-touch points into tools for individual use and reduce the need for frequent disinfecting, reducing risk and possibly being more cost-effective.

Surfaces that are touched by only one person, even infrequently, should still be periodically disinfected. Having individuals be responsible for daily cleaning and disinfecting of their assigned workspace, tools, and equipment, such as keyboard, phone, and computer mouse is highly recommended. Daily cleaning should also include removing clutter, papers, and books, which interferes with effective cleaning and disinfecting.



For some common-use items (e.g., printers, scanners), the responsibility for disinfection guidance could be assigned to each user of the equipment, with the disinfectant and instructions located nearby.

1.4 Understand Options for Disinfection

The fourth step is to select appropriate and effective cleaners and disinfectant chemicals. The term “germs” refers to all manner of microscopic biological agents, including viruses and micro-organisms such as bacteria, mold, and yeasts. Cleaning and disinfecting are two separate activities with independent objectives. While both are critical to removing unwanted germs from surfaces in the workplace, they must be viewed separately. How a surface is cleaned or disinfected may appear similar (both typically involve a liquid chemical product and a rag or paper towel), there are important differences, beginning with the composition of the chemical agent and what it is capable of doing. The actions of cleaning and disinfecting should be viewed separately and never combined.

Cleaners are chemical mixtures (“products”) that work to remove dirt, oils, dust and microorganisms from surfaces. While they can remove some of the germs from surfaces, many do not reliably kill or inactivate them. Products that are not designated as disinfectants, meaning EPA Registered, for specific types of germs are considered cleaners with respect to those germs.



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Disinfectants are chemical mixtures (“products”) that are registered with the US Environmental Protection Agency (EPA) as capable of killing or inactivating specific bacteria, fungi and viruses when used according to the instructions on the label. EPA regulates disinfectants under its “pesticide” program and assigns a unique registration number to each formulation. Manufacturers and formulators must submit test data to prove any claims made on the product’s label. EPA approves all product labels on disinfectants to ensure they provide reliable information regarding the effectiveness of the product and directions for safe use of the product. Most product labels can be reviewed before the product is purchased by searching the internet for “EPA Registration” followed by the registration number. (<https://www.epa.gov/pesticide-registration/what-are-antimicrobial-pesticides>)

In the case of the SARS-CoV-2 virus, EPA maintains a list of disinfectants that are believed to be capable of inactivating the virus that causes COVID. This list is referred to as the “EPA List N.” Because the virus is not commercially available to validate the efficacy of the disinfectants, List N includes disinfectants with demonstrated ability to inactivate “harder to kill” viruses or another human coronavirus. EPA List N is available on EPA’s web site and is subject to change as more products are deemed to be effective against the virus. (<https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2-covid-19>)

It should be noted that most disinfectants require the use of a cleaner if the surface is visibly dirty so that the disinfectant can do its job. If this step is needed, it will be noted on the product label.

Several Federal agencies (as well as some state agencies) regulate various products that are used to clean, sanitize and disinfect inanimate surfaces. Some agencies use terminology that is inconsistent with other agencies. While there are thousands of products that are approved by EPA, FDA, CDC, and state agencies as sterilants, sanitizers, germicides, sporicides, antiseptics, and disinfectants, the only products that are believed to inactivate SARS-CoV-2 on surfaces, and are appropriate for use (other than in healthcare and food processing facilities), are those on EPA List N. Note that this list does not include hand sanitizers, antiseptic washes, or antibacterial soaps that are intended to be used on the skin, and are therefore regulated by the Food and Drug Administration (FDA). FDA also regulates “sanitizers” which are used to sanitize food-contact surfaces in establishments under their jurisdiction.

DIRECTIONS FOR USE			
It is a violation of Federal law to use this product in a manner inconsistent with its labeling.			
	Amount of this product	Amount water	Instructions
FOR SANITIZING			
Work Surfaces	1 Tbsp	1 Gallon	Wash, rinse, wipe surface area with bleach solution for at least 1 minute, let air dry.
Dishes, Glassware, Utensils	1 Tbsp	1 Gallon	Wash and rinse. After washing, soak for at least 1 minute in bleach solution, drain and air dry.
Refrigerators, Freezers	1 Tbsp	1 Gallon	Wash, rinse, wipe surface area with bleach solution for at least 1 minute, let air dry.
Mops, Brushes, Sponges, Brooms and Rags	3/4 Cup (6 oz)	1 Gallon	Pre-wash items, then soak them in bleach solution for at least 1 minute. Rinse well and air dry.
FOR DISINFECTING			
Floors, Walls, Vinyl, Tiles	3/4 Cup (6 oz)	1 Gallon	Pre-wash surface, mop or wipe with bleach solution. Allow solution to contact surface for at least 10 minutes. Rinse well and air dry.
Bathtubs, Showers and Kitchen Sinks	3/4 Cup (6 oz)	1 Gallon	Pre-wash surface[, and] Wipe with bleach solution. Allow solution to contact surface for at least 10 minutes. Rinse well and air dry.
Laundry	1 Cup	Standard Washer	Use 1 1/2 cups bleach for extra large washers -or- heavily soiled loads. Use a detergent.



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Several innovative technologies have been proposed to inactivate the virus on porous and nonporous surfaces. Some of these have proven useful in healthcare and other highly sophisticated settings where concentrations of the virus would be expected to be substantial. Some of these technologies are listed below, **but none are recommended at this time** in non-healthcare workplaces such as office buildings, schools, hotels, or similar environments. Specific applications of these technologies may be appropriate for items, equipment, or products under controlled settings.

- **Ultraviolet (UV-C) Light:** UV-C light (260-285 nm) has been shown to effectively inactivate the virus where the light can reach; however, the extent to which the light can provide adequate treatment to surfaces in shadows and nonporous surfaces is not known. Importantly, short exposures to this wavelength light can cause skin burns and eye damage, posing serious risk to cleaners and occupants.
- **Heat and steam:** The virus is believed to be inactivated when exposed to temperatures above 65°C (150°F) for 5 minutes or more. The use of heat as a treatment technique for work surfaces has not yet sufficiently tested to be recommended. Using a microwave oven to heat items is not recommended as they may melt or catch fire.
- **Ozone (O₃):** A highly reactive gas at room temperature, ozone can be generated by an ozone generator. In order for ozone to inactivate coronavirus requires airborne concentrations that are hazardous, if not lethal, to humans. Furthermore, as a very strong oxidizer, ozone will degrade and corrode many common surfaces and materials.
- **Hydrogen peroxide (H₂O₂):** In some healthcare settings, sophisticated devices generate a fog of hydrogen peroxide to disinfect surfaces. Like ozone, hydrogen peroxide concentrations required to be effective can be hazardous or lethal to humans. Some products containing H₂O₂ that are applied by wiping onto nonporous surfaces are approved by the EPA (List N) for health care and non-healthcare settings.
- **Broadcast spraying or electrostatic fogging of disinfectants:** Applying disinfectants as a wide area spray, mist or fog is not recommended as a routine means of disinfection. This technique does not remove dust and dirt and may miss surfaces that are not in the direct path of the spray. In addition, broadcast spraying of disinfectants poses greater risks to the applicator's eyes, skin and respiratory system. [Currently the US EAP office of pesticides does not recommend fogging, fumigation, or wide-area spraying to apply disinfectants, but are expediting reviews for applications to add directions for use with electrostatic sprayers.](#)

Note: The devices listed above do NOT appear on EPA List N, and do not require prior registration and approval by EPA as do disinfectant products. These “pesticide devices” are regulated to the extent that false and misleading claims about the devices’ efficacy or safety are prohibited.



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1.5 Using EPA List N

A good understanding of the information in EPA List N is essential when selecting and using a disinfectant for COVID. The list is presented with the following information for each manufacturer’s formulation:

EPA registration number: A unique number assigned by EPA to a manufacturer or formulator for a specific formulation, which must appear on the product’s label. On List N, these appear in a format like “xxxxx-xx” or “xxx-xxx.” A single registration number and formulation can be used by a formulator to produce supplemental products with different names. In these cases, a third set of digits is added onto the base number. Note that supplemental products do not appear on List N; however, they are approved for use by virtue of the first two sets of digits.

Active ingredients: The essential ingredients that provide the disinfectant properties to the product. Different active ingredients work in different ways to kill or inactivate germs. Some ingredients are noted as a class of chemicals, such as “quaternary ammonium compounds,” while others are noted as the chemical itself, such as “hydrogen peroxide.” Active ingredients are important when considering the health and safety of the person using the product, as well as when considering compatibility with other products and certain surfaces, such as metal finishes.

Product name: The name of the primary product. As noted above, other formulations may be available for some products, the registration number of which will contain the first two sets of digits, followed by a third set of digits. Information on other formulations can be found on List N under the first two sets of digits in the registration number.

List N: Products with Emerging Viral Pathogens AND Human Coronavirus claims for use against SARS-CoV-2

EPA Registration Number	Active Ingredient(s)	Product Name	Company	Follow the disinfection directions and preparation for the following virus	Contact Time (in minutes)	Formulation Type	Surface Type	Use Site	Emerging Viral Pathogen Claim?	Date Added to List N
1043-129	Quaternary ammonium; Isopropanol	Vesta-Syde SQ64 Ready-to-Use Disinfectant	Steris Corporation	Feline calicivirus	10	RTU	Hard Nonporous (HN); Food Contact Post-Rinse Required (FCR)	Institutional	Yes	05/07/2020
71654-5	Glycolic acid	Glyclean Hard Surface Cleaner	The Chemours Company FC LLC	Rhinovirus	10	RTU	Hard Nonporous (HN)	Residential	Yes	05/07/2020
70271-34	Quaternary ammonium	KIK Antibacterial Multipurpose Cleaner I	KIK International LLC	Rhinovirus	10	RTU	Hard Nonporous (HN); Food Contact Post-Rinse Required (FCR)	Healthcare; Institutional; Residential	Yes	05/07/2020



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Company: The name of the manufacturer or formulator.

Follow the disinfection directions: Some product labels contain separate directions for different types of organisms. Until specific directions for use against the COVID virus are provided on labels, this column indicates which set of directions on the existing label should be followed to be effective against COVID.

Contact time: The number of minutes that the product must remain in contact with (and visibly wet on) the surface being disinfected. This is important from a feasibility standpoint (for example, where the product might run off a vertical surface like an elevator keypad or a doorknob or may evaporate and require additional application). It may also be important from a productivity standpoint, in that a longer contact time may require more labor hours to disinfect a given set of surfaces.

Formulation type: The type of product. Some products are ready to use (RTU), either as a liquid, spray, or in a pre-moistened towelette. Other products are sold as a concentrate that must be diluted before use.

A pre-moistened towelette or wipe may be the easiest to use but the most expensive. A spray may provide better coverage in crevices and on uneven surfaces, but causes more of the product to become airborne, posing a possible inhalation hazard. A concentrate may be the least expensive product but may pose special worker health and safety issues when mixing and diluting the concentrate. Vaporizers may require the least manpower to apply but may pose the greatest risk to human health and safety.

Surface type: Each disinfectant is approved only for designated types of surfaces. Surfaces are categorized as follows:

- Hard nonporous (e.g., metal, plastic, glass, ceramic tile, porcelain, vinyl wallcovering, finished wood);
- Porous (e.g., paper, cardboard, fabric, upholstered furniture);
- Porous (laundry pre-soak only) which includes clothing and other fabric items that may need to be laundered after being treated, and
- Food-contact surfaces often require a post-treatment rinse, such as kitchen counters, sinks and appliances.

The large majority of disinfectants on EPA List N are approved for hard nonporous surfaces only. Specific surface types for which each product is effective are further delineated on the product label.

1.6 Selecting Disinfectants

At this writing, EPA List N contains approximately 400 disinfectants, many of which are sold in other formulations. To facilitate its use, the EPA website contains a [tool](#) that enables the list to be sorted by any of the columns described above. It can also be printed to paper or a PDF for easy searching. Many employers have found EPA List N to be a good starting point for selecting appropriate disinfectants.

Employers should review their lists of multi-touch surfaces designated for routine disinfection and combine surfaces into groups with similar surface types and other conditions that require specific disinfectant properties. For example high-touch surfaces used in areas with limited or no mechanical ventilation, a spray-applied disinfectant may not be advisable. Metal or painted finishes that may be susceptible to corrosion or



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deterioration by certain chemical ingredients (e.g., sodium hypochlorite) might be damaged by products containing these ingredients. Because it may be difficult to keep vertical surfaces (e.g., wall switch-plates or door handles) wet for an extended period of time, these surfaces should be disinfected with a product with a shorter contact time.

The requirements for each type of surface should be compared to the available formulations in EPA List N. If additional information is needed, a copy of the product label and safety data sheet (SDS) can be obtained on the internet or from the manufacturer. Manufacturer representatives can often recommend other supplemental products that may be a better choice for the type(s) of surfaces that need to be disinfected.

In selecting specific disinfectant products approved for use with the virus, the following characteristics should be considered. This information is listed on the product label and the SDS, and may be supplemented by information from the manufacturer:

- Availability for purchase: Check availability in the short- and long-term.
- Appropriateness for the intended surface: Look for “use sites” on product label.
- Active ingredients: Identify the class and specific ingredients.
- Formulation: May come as a liquid, concentrate, spray, disposable wipe or fogger ingredient.
- Contact time: How long the surface must remain wet with the disinfectant (according to the label) to inactivate the virus.
- Chemical compatibility: Ensure it does not degrade or corrode the surfaces on which it will be used. **(NOTE:** do not mix different types of disinfectants or disinfectants with other chemicals, unless otherwise directed to by the manufacturer).
- Health risk: Select the lowest hazard products that are effective for the task. See “Selecting environmentally preferable products” below.
- Environmental factors: Ensure that the product is only used in the intended manner and will not result in harm to the environment or people.
- Pre-treatment: Understand if there is a requirement to pre-treat or pre-clean surfaces. Many disinfectants can only be used on cleaned surfaces.
- Type of PPE needed for mixing and/or use, and the availability of such PPE.

CDC recommends that if appropriate products on EPA List N are not available due to supply chain issues, another product should be selected whose label confirms that it has an EPA registration number and that “human coronavirus” is listed as a target pathogen.

1.7 Selecting Environmentally Preferable Products

Cleaning and disinfecting with less-toxic products and tools can help control the spread of infectious disease and lessen the health impact on the user and the environment. The availability of less-toxic cleaning products has grown in recent years, and employers are encouraged to ask their vendors for information about these products.



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The US EPA has established two programs that evaluate health and environmental hazards of chemicals used for cleaning and disinfecting. These are known as the **Safer Choice Program** (for cleaners) (<https://www.epa.gov/saferchoice>) and **Design for the Environment for Pesticides** (for disinfectants) (<https://www.epa.gov/pesticide-labels/design-environment-logo-antimicrobial-pesticide-products>). Employers should look for these logos on the label during the selection process.

Safer Choice has identified over 2,000 **cleaning** products approved to use this label, which indicates that the use of these products is generally safer and better for the environment.

Design for the Environment (DfE) for Pesticides has approved 7 active ingredients as safer alternatives to other classes of **disinfectant** ingredients. These safer ingredients appear in at least 70 products on the EPA N List. These products contain the least-hazardous classes of EPA-approved disinfectants, including citric acid, hydrogen peroxide, L-lactic acid, ethanol, isopropanol, peroxyacetic acid, and sodium bisulfate. Some of these products may also contain ingredients that are not on the DfE list.

Although these products may be less hazardous to workers and the environment, they are still designed to disinfect surfaces, and can still be irritating to the skin and corrosive to some surfaces long term. Be sure to follow label instructions.

Regardless of the cleaners and disinfectants used, to protect the health of the cleaners, the heating, ventilating and air-conditioning (HVAC) systems should be operating and introducing fresh, outdoor air into the spaces during cleaning and disinfecting, and for several hours after. To protect the health of the occupants, cleaning and disinfecting should be done after hours whenever possible.

2. IMPLEMENT THE PLAN

2.1 Understand OSHA requirements

Before implementing the plan, each employer should understand OSHA regulations regarding the hazards posed not just by the virus, but also by the chemical products used as cleaners and disinfectants.

According to OSHA's General Duty Clause (Section 5(a)(1) of the OSH Act), all employers must provide their employees with a safe and healthy workplace. In response to the hazards posed by COVID, the General Duty Clause would require employers to enact hazard mitigation strategies that may include social distancing measures, as well procedures to clean and disinfect multi-touch surfaces in the workplace.

Other, more specific OSHA regulations are intended to protect workers from hazardous materials they work with, such as cleaners and disinfectants. Many employers already have OSHA-required written and procedural programs for communicating the hazards of chemical materials to their employees, referred to as Hazard Communication Programs. These employers should review their programs to ensure they adequately cover cleaning and disinfecting products being used in response to the virus. Other employers may have to develop these programs entirely from scratch. OSHA's Hazard Communication Standard (29 CFR 1910.1200) requires employers to maintain SDSs for each chemical product in the workplace, to make them available to employees, to train employees in their use, and to ensure that all hazardous material containers



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are properly labeled. Employers should also keep on file Product Labels for disinfectants as they provide critical information on their proper use and hazards.

To protect employees who must use respirators and other PPE, OSHA requires written and procedural programs (29 CFR 1910.134 and 1910.132). Employers who already have such programs should ensure they adequately cover respirators or PPE that is deemed necessary for cleaning and disinfecting. Other employers may have to develop and implement these programs.

Before employees wear PPE, such as face shields, gloves, and protective clothing, the employer must conduct a “PPE risk assessment” to identify the physical and chemical hazards faced by these employees, and to evaluate the ability of selected PPE to mitigate these hazards. When PPE is deemed necessary to protect employees, employers must train these employees in its use and provide the PPE at no cost to the employee.

Respirators must be provided to each employee for whom a hazard assessment concludes that such equipment is necessary to protect their health. The employer must provide respirators that are applicable and suitable for the purpose intended, at no cost to the employee. When respirators are needed and used, the employer must first establish a Respiratory Protection Program, as per OSHA 1910.134, which includes requirements for medical evaluation, fit testing, and training for workers who will wear respirators. (<https://www.aiha.org/education/frameworks/technical-framework-resource-respiratory-protection-programs>)

During the first few months of the COVID-19 pandemic, N95 respirators and face masks have been widely used, often without regard to important differences, such as:

- Face masks (surgical or home-made) are not considered PPE or respirators, because of the minimal protection they provide to the wearer.
- Face masks are worn to protect other nearby persons from being infected by the wearer of the mask.
- N95 respirators provide the wearer nominal protection against airborne particles, including droplets and aerosols containing virus material.
- N95 respirators are considered by OSHA to be air-purifying, negative-pressure respirators, and are therefore covered by OSHA’s Respiratory Protection Standard.
- Voluntary use of N95 respirators by employees is allowed, but certain provisions must first be met. (https://www.osha.gov/video/respiratory-protection/voluntaryuse_transcript.html)
- Most N95 respirators do not protect against chemical vapors, however some specialty disposable N95 respirators can reduce “nuisance organic vapors.”

NOTE: Workers performing routine cleaning and disinfection are not required to wear respirators to protect them from the virus, unless they are in an area that requires respiratory protection based on the employer’s hazard assessment. When the label on a disinfectant requires the use of a respirator, it is to provide protection from the chemical(s) emitted from the product. Only the respirator specified on the label (if any) should be used.

Workers who are not required to wear respirators should wear face masks when deemed necessary by their employer, in order to reduce the risk of transmitting the virus to other employees. Cloth masks are not respirators and OSHA’s requirements under the respiratory protection standard do not apply.



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2.2 Prepare Standard Operating Procedures (SOPs)

The fifth step is for the employer to prepare a written set of step-by-step instructions for workers to carry out when cleaning and applying disinfectants. These standard operating procedures (SOPs) need to be written in simple language and provide a concise “how to” guide on executing the tasks. In some cases, the SOP preparer may want to interview the personnel involved in the process on how they perform the task.

When preparing an SOP, it is best to use a series of short, simple steps. It is important to consider the audience’s language abilities and prior knowledge and experience. If the audience includes employees who do not speak English as their primary language, be sure that appropriate translations are also provided. Annotated pictures and diagrams facilitate communication. If multiple people are reading the SOP at the same time (those in different roles), it should read more like a conversation (e.g., User 1 completes an action, followed by User 2, and so on). That way, each person can see of the specific role they play in the procedure.

For the written SOP, the following items should be covered:

- **Scope and applicability.** Describe the purpose of the process, its limits, and how it is used. Include applicable standards, regulatory requirements, and roles and responsibilities.
- **Methodology and procedures.** List all the steps with necessary details, including what equipment is needed. Cover sequential procedures and decision points. Address the “what ifs” and safety considerations.
- **Clarification of terms and definitions.** Identify and define acronyms, abbreviations, and phrases that are not common language to those with a particular job.
- **Health and safety warnings.** List these in a separate section, and alongside the steps, where they may be an issue.
- **Equipment and supplies.** Provide a complete list of what equipment and supplies are needed and where they are stored.
- **Cautions and interferences.** Cover what could go wrong, what to look out for, what may interfere with the process, and when to call in a supervisor or an industrial hygienist.

Each page should have control document notation, such as, a short title or ID #, a revision number, date, and “page # of #”. Test the procedure, address any concerns, and make necessary improvements or updates. Have the SOP reviewed by those who actually do the procedure, and reviewed by appropriate managers and technical advisors. Once approved, implement the SOP. This will involve training user personnel on applicable information. Ensure the SOP remains current. Employers should provide easy access to SOPs and any written plans.

2.3 Train Employees

Enhanced cleaning and disinfection poses a risk to custodians and cleaning staff due to potential contact with the virus and from the disinfectants being used. All employees should be trained in COVID prevention and response issues, which is covered in the companion AIHA document, *Reducing the Risk of COVID-19 using Engineering Controls*. With regard to cleaning and disinfection, all employees and contractors will require some amount of training to understand the program, and workers who use cleaners and disinfectants.



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tants will require additional training on how the materials are to be used and how to work safely with those materials. Training must be offered during regularly scheduled work times and at no cost to the employee.

Training topics to be discussed include:

- How to clean and disinfect safely:
 - Review SDS.
 - Review SOPs.
 - Review disinfectant EPA product labels (which must be followed).
 - Review safe dilution and application.
 - Review disposal requirements for the container and any unused product.
- When, and what type of PPE (including respirators) need to be used based on which product is being used and in what manner.
- How to use PPE and respirators properly:
 - Limitations on protection.
 - Rules for safe use.
 - Cleaning and disinfecting PPE and/or respirators.
 - Periodic inspection, maintenance, and replacement.
 - Putting on and taking off (donning and doffing), and proper disposal of PPE.



Cleaning and disinfection team members should be trained on OSHA regulations, CDC guidelines and AIHA guidance documents.

- Design structured, targeted, mandatory training for COVID cleaning team members.
- Include participatory, hands-on training.
- Develop the training program according to the intended audience, in terms of education, language and literacy level.
- Develop training content specifically for COVID cleaning team members who may be responsible for cleaning procedures.
- Maintain training records, including dates, training content, and the names of the trainers and trainees.
- Select appropriate qualified trainers with knowledge and experience in safety, industrial hygiene, or public health.

Training of team members should include, at a minimum:

- General introduction to the principles of environmental infection control and prevention, including the transmission of germs, with specific reference to currently known information about COVID.



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- How COVID cleaning team members can protect themselves from pathogens.
- Detailed review of the specific cleaning tasks they are assigned, including a review of SOPs, checklists, and other job aids.
- When and how to safely prepare and use various cleaners and disinfectants.
- Safe storage of supplies and equipment (including PPE).
- How to properly dispose of PPE, cleaning supplies, and waste (e.g., mop water, rags, etc.).
- Hands-on component with demonstration and practice.
- Key areas of the cleaning and disinfection operations (e.g., trash removal, surface cleaning, surface disinfection, waste disposal).
- How to recognize when a surface may be too damaged to clean or disinfect.
- Other health and safety aspects, as appropriate.

2.4 Coordinate with Building Owner/Manager and On-site Contractors

It is important to communicate and coordinate with the owner/manager of the building and any on-site contractors about the employer's overall COVID prevention efforts, which would include cleaning and disinfecting requirements. Where employees must pass through an area controlled by building management or contractors, the employer should ensure that the areas are cleaned periodically and that multi-touch surfaces are dealt with appropriately. This may require negotiation of responsibilities and costs. Employees should be advised of who is responsible for what.

In some cases, such as when an employee or visitor who spent time in the building contracts COVID, an employer may want to retain a commercial cleaning and restoration company to perform "deep" or "enhanced" cleaning and disinfection. Contract services should be arranged in advance of need, on a contingency basis. Contracts for cleaning and disinfection should include the following specifications:

- A site-specific safety and health plan detailing how the work area will be controlled, what PPE will be used, procedures for cleaning and disinfection of porous and nonporous surfaces, and how and where waste will be disposed.
- Authorization to inventory personal effects and property (utilizing PPE to handle personal effects) with appropriate documentation.
- For disinfectant selection, select products appropriate for the surface or area selected for disinfection, as detailed above.
- Delineate specific areas and surfaces to be cleaned and/or disinfected by the contractor.



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3. MAINTAIN, UPDATE, AND REVISE THE PLAN

Employers will need to maintain, update, and revise the plan as necessary as more information related to the virus and COVID becomes available. With any updates, additional training of the employees may be required

3.1 Quality Assurance

A quality assurance (QA) program is an action plan to document the extent to which cleaning and disinfection of the workplace complies with the established site-specific program and applicable regulations. QA inspections provide a means to control and record the proper execution of the work and to review the work being accomplished. QA inspections should be performed at several levels, each with their own designated frequency. For example, a first- or second-line supervisor should inspect frequently each day, with another level of management inspecting on a weekly or bi-weekly basis. Special cleaning by a contractor, such as after a person with COVID has been in an area, may include special QA measures, such as the use of a third-party inspector or industrial hygienist.

NOTE: After a person with COVID has been in a workplace, it is important that all surfaces the person may have touched in the past seven (7) days be disinfected. Quality assurance for the correct completion of disinfection should consist of employee training, the availability of appropriate supplies, and close supervision and documentation of the work by competent individuals or an independent third party.

These quality assurance measures are more useful and informative than collection of any type of “post-disinfection” samples. Regardless of the sampling method, sampling can only be feasibly completed on a relatively limited number of areas on the cleaned surfaces. The absence of detectable virus on sampled areas does not provide any form of confirmation that the virus is not present on other areas that were not sampled. It also provides no certainty that the sampled area of the surface could not become re-contaminated after cleaning and sampling is completed. For these reasons, sampling for viral components is not considered a reliable means of validating the effectiveness of cleaning and disinfection.

The QA program should compile a record of inspection objectives, the inspection procedures used, the number and scope of observations, compliance with performance objectives, and recommendations for program improvement.

3.2 Program Review and Improvement

There is still much to learn about the transmission and infectivity of the virus, including how much of the virus is required to cause a person to contract COVID. This information would be useful to guide cleaning programs. Therefore, a cleaning and disinfection program should be reviewed and adjusted to incorporate relevant information as it becomes available.



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4. REFERENCES

WHO

- [Cleaning and disinfection of environmental surfaces in the context of COVID-19](#)
- [Q&A: Considerations for the cleaning and disinfection of environmental surfaces in the context of COVID-19 in non-health care settings](#)

OSHA

- [Revised Enforcement Guidance for Recording Cases of Coronavirus Disease 2019 \(COVID-19\)](#)
- [Updated Interim Enforcement Response Plan for Coronavirus Disease 2019 \(COVID-19\)](#)
- [OSHA-NIOSH INFOSHEET – Protecting Workers Who Use Cleaning Chemicals](#)
- [Decontamination](#)

CDC

- [Cleaning and Disinfecting](#)
- [Cleaning and Disinfecting Your Facility](#)
- [Guidance for Cleaning and Disinfecting Public Spaces, Workplaces, Businesses, Schools, and Homes](#)
- [Cleaning and Disinfection Tool – Guidance for Cleaning and Disinfecting Public Spaces, Workplaces, Businesses, Schools, and Homes](#)
- [Reopening Guidance for Cleaning and Disinfecting Public Spaces, Workplaces, Businesses, Schools, and Homes](#)

EPA

- [COVID-19 Implications for EPA's Enforcement and Compliance Assurance Program](#)
- [Frequent Questions about Disinfectants and Coronavirus \(COVID-19\)](#)
- [Frequent Questions about Indoor Air and Coronavirus \(COVID-19\)](#)
- [List N: Disinfectants for Use Against SARS-CoV-2](#)

AIHA

- [Workplace Cleaning for COVID-19](#)
- [Business Services \(Banks, Notaries, Title Companies, etc.\) Guidelines](#)
- [General Office Settings Guidelines](#)
- [Hair and Nail Salon Guidelines](#)

Other Professional Organizations

- [Safer Products and Practices for Disinfecting Surfaces](#)
- [ASHRAE Position Document on Airborne Infectious Diseases](#)
- [RIA-IICRC Preliminary Report for Restoration Contractors Assisting Clients With COVID-19 Concerns](#)
- [AIA Re-occupancy Assessment Tool V1.0](#)



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AIHA®

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About Occupational Health and Safety Professionals

Occupational health and safety (OHS) professionals (also known as industrial hygienists) practice the science of anticipating, recognizing, evaluating, and controlling workplace conditions that may cause workers' injury or illness. Through a continuous improvement cycle of planning, doing, checking and acting, OHS professionals make sure workplaces are healthy and safe.

Get additional resources at AIHA's [Coronavirus Outbreak Resource Center](#).

Find a qualified industrial hygiene and OEHS professionals near you in our [Consultants Listing](#).



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