



## Product Technical Bulletin

**Date:** March 16, 2020

**Subject:** Drive DeVilbiss 525/1025 Oxygen Concentrators: Cleaning & Disinfecting Guidelines

The recent outbreak of the COVID-19-human coronavirus has generated some questions regarding safe and appropriate cleaning and disinfection guidelines for oxygen concentrators that are being used/re-deployed between patients.

### COVID-19 Coronavirus & Medical Equipment

There is limited published scientific data on the COVID-19 virus. However, there are published data on other strains of human coronaviruses, such as the strains that caused SARS and the MERS. To date, there is no evidence of coronavirus transmission from inanimate objects; the CDC states that while it may be possible, it is an unlikely cause. The evidence does demonstrate coronavirus to have limited survival on inanimate surfaces, and that it can be deactivated with simple cleaning materials and process.<sup>1,2</sup> Studies validate the use of diluted bleach solutions are highly effective and efficient surface disinfectants for human coronavirus.<sup>1,2,3</sup>

### DeVilbiss 525 & 1025 Series Cleaning & Disinfecting Method

The cleaning and disinfection protocol that is outlined in this document can be found in all 525 and 1025 series oxygen concentrator user manuals. It can be located in the section titled “*Provider Notes-Cleaning and Disinfecting When There is a Patient Change.*” In addition to this protocol, we recommend providers follow their infection control and universal precaution policies, as well as any other federal, state or local infection control policy.

The DeVilbiss cleaning and disinfecting protocol utilizes a diluted chlorine bleach (sodium hypochlorite) solution. This cleaning method is a third-party laboratory validated disinfecting method against myriad pathogens, including but not limited to *Staphylococcus*, *Pseudomonas*, *Escherichia coli* and *Klebsiella* in DeVilbiss respiratory devices.<sup>4</sup> Diluted bleach solutions are very effective disinfection agents that have been safely used as hospital surface and medical device disinfectants for decades.<sup>5</sup> The diluted bleach solution required for the external cleaning and disinfection of the oxygen concentrators is based on the use of a standard, *5.25% chlorine bleach mix of 1 part bleach and 4 equal parts water and 10 minute contact time.* This formula produces a 1% or 10,000 ppm bleach solution. This concentration of bleach solution is 5 to 10 times stronger than solutions proven in clinical studies to deactivate coronavirus on hard surfaces and inanimate objects.

### DeVilbiss 525 & 1025 Series Filters

The 525 & 1025 series concentrators incorporate a number of filters throughout the gas path. The primary filters include the inlet gross particle filter and two high efficiency particle (HEPA) filters. The gross particle filter is intended to prevent large dirt/dust particles from entering the concentrator cabinet. Next is the air inlet HEPA filter, which filters the ambient air before it flows to the compressor. The 525 and 1025 inlet HEPA filters have an efficiency of >99.97% for particles at 0.3 microns. The last HEPA filter is the final outlet filter, which is located just prior to the patient outlet. This filter is intended to capture any potential fine particles that may be present in the oxygen before it is delivered to the user. This final stage HEPA has an efficiency of 99.9% at 0.3 microns.

Published research supports coronavirus deactivation correlates to higher temperature and lower humidity.<sup>6</sup> Laude demonstrated thermal deactivation of coronavirus with temperatures of 30-60°C.<sup>7</sup> During the flow through the compressor and into the sieve beds the internal gas will see temperatures of 79-87°C.

Although not required as part of preventive maintenance and in an abundance of caution in the current environment, in addition to following the cleaning and disinfection instructions that you consider changing both the gross particle and inlet HEPA filters between patient use.

## DISINFECTION INSTRUCTIONS FOR DRIVE DEVILBISS 525/1025 CONCENTRATORS<sup>8</sup>

1. Use disinfectants safely. Always read the label and product information before use.
2. Always wear personal protection equipment when performing this procedure. Use suitable gloves and safety glasses. Cover exposed skin on arms to prevent accidental contact with bleach solution that has been applied to the Concentrator.
3. Dispose of accessories that are not suitable for reuse. This may include but not be limited to the oxygen tubing, tubing connectors, nasal cannula and/or mask, oxygen outlet connector, and humidifier bottle.
4. Clean the exterior of the Concentrator with a clean lint free cloth. Heavy soil should be removed with a clean lint free cloth dampened with water. A soft bristled brush dampened with water can be used to remove stubborn soil. Dry the Concentrator using a clean lint free cloth if water was used to remove soil.
5. Use 5.25% chlorine bleach (Clorox Regular Liquid Bleach or equivalent). Mix one (1) part bleach with four (4) parts of water in an appropriate clean container. This ratio produces a one (1) part bleach to five (5) total parts solution (1:5). This produces a 1% or 10,000 ppm bleach solution. The total volume (amount) of solution required is determined by the number of concentrators in need of disinfection.
6. Apply the bleach solution to all exterior surfaces of the Concentrator using a clean lint free cloth in an even manner. The cloth should be **dampened only** and not dripping of solution. **Do not use a spray bottle to apply the solution-Do not saturate the device with the solution.** Take care that no solution enters the vent areas on the Concentrator Base or the Auxiliary O2 fitting area on the back of the unit. Avoid over-saturating the Cabinet seams so that no solution residue builds up in these areas. Avoid the Caster wells located on the bottom of the unit.
7. Exposure time of the disinfectant solution should be 10 minutes minimum to 15 minutes maximum.
8. After the recommended exposure time, all exterior surfaces of the Concentrator should be wiped with a clean lint free cloth dampened with drinking quality water no warmer than room temperature. **Dry the unit with a dry, clean lint free cloth.** This is to remove residue that may stain or leave a film on the unit, especially after repeated disinfections.

### References

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<sup>1</sup>Kampf, et al. Persistence of coronaviruses in inanimate surfaces and their inactivation with biocidal agents. *Journal of Hospital Infection*. 2020(104): 246-25.

<sup>2</sup>Hulkower, et al. Inactivation of surrogate coronaviruses on hard surfaces by health care germicides." *American Journal of Infection Control* 39.5 (2011): 401-407.

<sup>3</sup>Rutala WA, Weber DJ. Uses of inorganic hypochlorite (bleach) in health-care facilities. *Clinical Microbiology Reviews*.1997. Oct:1;10(4): 597-610.

<sup>4</sup>The diluted chlorine bleach cleaning & disinfecting method was independently validated on oxygen devices by Nelson Labs; test report INOV-VERIF-0268 rev04.

<sup>5</sup>Rutala WA, Weber DJ. Uses of inorganic hypochlorite (bleach) in health-care facilities. *Clinical Microbiology Reviews*. 1997. 1;10(4):597-610.

<sup>6</sup>Kampf, et al. Persistence of coronaviruses in inanimate surfaces and their inactivation with biocidal agents. *Journal of Hospital Infection*. 2020(104): 246-25.

<sup>7</sup> Laude, H. Thermal inactivation studies of coronavirus, transmissible gastroenteritis virus. *Journal of General Virology*. 1982(56): 235-240

<sup>8</sup>Drive DeVilbiss 525 & 1025 Series User Manual. *Provider Notes-Cleaning and Disinfecting When There is a Patient Change*