SAFETY BULLETIN 21/20

COVID-19 - Measures to Disinfect Externally Contaminated Gas Packages

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COVID-19 - Measures to Disinfect Externally Contaminated Gas Packages

1. Introduction

AIGA member companies that are producing medical gases are deploying resources to support the healthcare system in order to deal with the current emergency situation due to the spread of the coronavirus disease (COVID-19).

Gas packages can become externally contaminated due to their use in healthcare facilities, ambulatory services, and homecare settings. It is important that these containers are disinfected in a manner that removes the contaminants, does not cause damage to the package and its accessories, and does not lead to a hazardous situation during the filling and use of these packages.

This Safety Bulletin is a guideline for AIGA members to be used in addition to AIGA 105 *Guidelines for Cleaning Externally Contaminated Medical Gas Containers*. However, in the current circumstances of the "coronavirus pandemic", it is important that gas packages coming back to filling facilities from healthcare facilities and homecare settings are treated with specific attention, assuming that they could be contaminated.

The determination of which gas packages and of what part of gas packages need to be disinfected shall be evaluated by risk assessment.

The disinfecting shall be completed prior to the pre-fill inspection. This Safety Bulletin does not cover the collection of packages at customer sites, it also does not cover external or internal cleaning of the package.

Additional or divergent measures could be required by local/national authorities.

Gas packages include gas cylinders, bundle of cylinders and cryogenic containers including its accessories.

2. Personal Protective Equipment (PPE)

The processes described below require the use of specific PPE, which shall be determined during the risk assessment, taking into account any exposure through skin contact, inhalation or ingestion.

See also AIGA 066, *Selection of Personal Protective Equipment*, for information on PPE requirements.

3. Process for disinfecting gas packages

When receiving gas packages at the filling site, as a reaction of the possible survival time of the virus on surfaces up to several days, move any identified gas package to the designated area according to the risk assessment and instructions.

- Before moving any package from the designated area use the appropriate PPE;

- Remove packages from the designated area and transfer to the designated disinfection area;
- Ensure the valves are in the fully closed position;
- Before a disinfection process is started, using a spraying method, it is of paramount importance to cover all openings (e.g. valve outlets, fill ports etc.) by either a nut or plug (preferred) or a plastic cap compatible with the disinfection agent.

Note: A quarantine period of time of possibly contaminated packages could be sufficient to inactivate the virus.

Disinfecting process:

All processes described below are based on specific disinfection agents. All of them have concerns because virus deactivating chemicals can potentially damage certain materials usually in gas packages. Any process shall be subject to a risk assessment including in particular the following aspects:

- Spraying can lead to very small droplets entering into small cavities of pressure equipment and are difficult to remove after cleaning.
- Spraying alcohol-based chemicals could create a flammable, even explosive atmosphere.

The wiping method minimizes the volume of liquid required to perform the process while spraying would maximize the number of packages that can be treated in a certain period of time.

The following agents are widely available and recommended to inactivate the virus:

- Option 1: ≥ 70% IPA (Isopropyl alcohol) or EA (Ethyl alcohol). Leave the disinfectant for minimum two minutes;
- Option 2: 0,1% sodium hypochlorite solution. Leave the disinfectant for minimum two minutes;
- Option 3: 0,5% hydrogen peroxide solution. Leave the disinfectant for minimum two minutes;

NOTE The order of the options do not reflect any order of preference.
NOTE In a laboratory environment one minute is sufficient. The above mentioned application times are recommended to meet field conditions, e.g. working under time pressure that might cause inaccuracies in time measuring, difficulties to ensure an accurate time surveillance for each package of a batch etc.
NOTE For disinfection of VIPRs with integral guards, sodium hypochlorite or hydrogen peroxide solutions may penetrate and reach metallic parts of the VIPR without possibility of rinsing them adequately. Consequently, corrosion may quickly occur leading to damages to the VIPR.
NOTE Due to potential material attacks in case option 2 or 3 is applied it is recommended to implement a system enabling identification of the packages submitted to a disinfection process.

These recommendations are based on "*Review Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents" in Journal of Hospital Infection 104 (2020) 246-251, journal homepage* www.elsevier.com/locate/jhin

Attention is required to the following:

- Never reuse disinfecting wipes. Individual wipes shall not be used across different packages. Disposal of wipes shall be in accordance with local regulations. The wipes preferably should not consist of fibre-based material (avoid potential of lint).
- To prevent long term damage to the equipment the chemical agent concentrations shall not exceed 2% hydrogen peroxide or 0,5% sodium hypochlorite.
- Furthermore, the equipment should not be exposed to these chemicals for a period exceeding 15 minutes. Specific attention shall be paid to residuals in cavities.
  Higher concentration than those described in the options would require a reduction of the time period.
  This note is based on the publication *"Effect of hydrogen peroxide on the dezincification of brass in acidified sodium sulfate solution under free corrosion conditions" in J. Mater. Environ. Sci. 1(1) (2010) 58-69.*

The risk of contamination inside of a valve outlet is considered to be minor versus the surfaces. However, since the introduction of disinfectants into the valve outlet(s) raises several concerns regarding material compatibility and safety it is recommended not to do so. For all agents, care shall be taken to remove residuals after the disinfection process. Residues can cause risks such as material incompatibly or contamination of the gas.

Methods that may be considered for removing disinfectant residues are

- wiping off,
- rinsing with cleaning water or
- drying by blowers in case IPA or EA is applied
- or combination of the above.

Note: If the package has visible contamination related to its medical use (e.g. bodily fluids) then the package should be carefully wiped with a disinfection product and then wiped clean since these could also be contaminated by the virus.

Return the package to the filling process.

4. Other disinfectants and methods not recommended or used with caution

4.1 Other disinfectants

There are many disinfectants commercially available from various suppliers. AIGA cannot provide recommendations on specific manufacturers. In every case it is recommended to investigate the following points:

Disinfectants can:

- Be hazardous for personnel;
- Leave high levels of residuals that have the potential to contaminate the gas;
- Can cause damage to materials including steel, aluminium alloy, brass and non-metallics such as plastics;
- Can cause stress corrosion cracking.

4.2 Not recommended methods

Specifically, the use of ozone and dry ice are not recommended due to concerns regarding toxicity (ozone), effectiveness and gas package material compatibility.

4.3 Methods to be applied with caution

Another disinfectant method is water steam (wet or dry) or hot water.

When using this method particular attention shall be paid to the points below and a risk assessment shall be conducted.

- High-pressure water/steam jet at high temperatures can damage equipment such as valves with integrated pressure regulators (VIPR).
- The equipment has usually undergone a type approval process according to ADR and/or related standards that often defines a maximum operation temperature of 65°C. When applying water temperatures above it is recommended to assess eventually material compatibility or functionality issues.
- The process creates an environment of “contaminated droplets” which requires personnel protection.
- The process can create issues regarding the disposal of the contaminated water.
- As a reference heat at 56°C kills the SARS coronavirus at around 10000 units per 15 min (quick reduction). https://www.who.int/csr/sars/survival_2003_05_04/en/