

Protocol: Cleaning the NASG after Use

1. Wear heavy utility gloves.
2. Rinse the NASG in cool water and use a brush to remove tissue and other material.
3. Prepare a 0.01% bleach solution in a 60L plastic container. If using 3.5% bleach (commonly found in Africa), put 30L of water and 100mL of bleach to create this ratio. For other bleach concentrations, please use our Interactive Bleach Concentration Worksheet or the table below.
4. Decontaminate the NASG by submerging it in the container for 10 minutes. You may need to put a brick, stone, or other heavy object on the NASG to keep it under water. Do not handle the NASG during this time.
5. Do not leave the NASG in the solution for more than 10 minutes. (It will damage the garment.)
6. Wash the garment with detergent and cool water, by hand or in a washing machine. It is best to wash the NASG alone because other items like threads and lint will adhere to the Velcro.
7. If washing by hand, squeeze the NASG to expel excess water before drying.
8. Hang the NASG to dry, either outside or inside.
9. The NASG should be removed from sunlight as soon as it is dry.
10. Once completely dry, fold and store the NASG.

<b>Brand of Bleach and Country/Region Where Used</b>	<b>Percent Available Chlorine/Sodium hypochlorite</b>	<b>Ratio Bleach : Water</b>	<b>Volume of Bleach in ml (L)</b>	<b>Volume of Water (L)</b>
<b>JIK (Africa)</b>	3.5%	1:350	100mL (0.1L)	30L
<b>Household bleach, Clorox (North America, Peru), Eau de Javel (France, Vietnam), Jif/Red &amp; White (Haiti), Odex (Jordan)</b>	5%	1:500	60mL (0.06L)	30L
<b>Blanqueador/Cloro (Mexico)</b>	6%	1:600	50mL (0.05L)	30L
<b>Lavandina (Bolivia)</b>	8%	1:800	40mL (0.04L)	30L
<b>Chloros (UK)</b>	10%	1:1000	30mL (0.03L)	30L
<b>Extrait de Javel (France), Chloros (UK)</b>	15%	1:1500	20mL (0.02L)	30L

## Protocol Justification

The NASG cleaning protocol was modified when further investigation demonstrated that using a less concentrated bleach solution is equally as effective in decontaminating the NASG as previous guidelines. This change in protocol occurred after two independent research teams investigated the effectiveness of a 0.01% bleach solution in decontamination (Galleher, 2013; Carlin, 2012).

After demonstrating that a 0.01% solution (achieved by diluting 3.5% commercial bleach in a 1:300 ratio with water) was equally effective in decontaminating the NASG as a 0.05% solution, the protocol was updated to reflect this finding. Bleach causes neoprene (the NASG material) to deteriorate. Therefore, using a less concentrated solution will increase the lifespan of the NASG and allow the garment to be used many more times. Using the previous guidelines, the average NASG could be used 40 times; while the number of uses using the new cleaning protocol is unknown, this number is expected to increase.

Two independent studies tested both the effectiveness of a 0.01% bleach solution as well as alternate disinfectant techniques. The researchers were able to determine that low temperature ambient gas air plasmas, UVA radiation, and quaternary ammonium chloride are all effective NASG disinfectants. However, when determining the final protocol, bleach was preferable because of its low-cost and availability in locations where the NASG is most commonly used. However, it is important to note that in cases where these alternate materials and techniques are available, they can also be used as disinfectants.

In one study, Galleher et al. tested the effectiveness of the 0.01% solution, using *E. coli* to determine the death rate of the bacteria in the bleach solution. HIV and HCV are two viruses that can be transmitted via blood and therefore are a concern when cleaning the NASG. Investigators used the bacteria *E. coli* as a proxy for HIV and HCV in their research because the bacteria were easier and safer to obtain. While less is known about HCV disinfection (possibly because of higher difficulty culturing HCV), *E. coli* is harder to kill (requiring a longer exposure time and higher bleach concentration) when compared to HIV disinfection with bleach. When conducting their research, investigators determined that the 0.01% concentration was an effective solution in killing the *E. coli* bacteria and therefore an appropriate and effective disinfectant to use for the NASG. Investigators also researched other types of disinfectants including low temperature ambient gas air plasmas and UVA radiation. While these two alternate disinfectants were effective, they are not included in the official protocol which also takes into account the community and resources available where the NASG is most widely used.

In a second study, Carlin compared bleach and quaternary ammonium chloride (QAC). QAC is a chemical used by laundry supply companies in the United States. QAC was recommended because it effectively kills both HIV and HCV and it does not degrade neoprene (the NASG material). However, the disadvantage of QAC is its cost in comparison to bleach. While the cost of bleach per cleaning is \$0.16-0.40 QAC would cost \$3.16-5.21. Additionally, bleach is readily available in the communities where the NASG is most widely used and QAC availability has not been researched in those locations.

In addition to changes in bleach concentration in the protocol, cleaning steps were slightly amended. In the past, the garment was soaked in the bleach solution before scrubbing off tissue and other material.

In the updated protocol, the order of these two steps is switched and now tissue and materials are scrubbed off before the garment is soaked in the bleach solution. This new method is considered more effective because the presence of large quantities of tissue and materials degrade the decontamination solution more quickly.

References:

1. Carlin, Davis. NASG Disinfection Protocol Options and Notes. Unpublished report, 2012.
2. Galleher, Connor; Pavlovich, Matt; Sakiyama, Yukinori; Graves, David. LifeWrap Disinfection. Unpublished report, 2012.