How to improve your water safety?

Here are some technical suggestions how to “treat” your water system in a good manner:

- Keep the entire system always as clean as possible
- All water handling tools (hoses, fittings, sanitizers) shall be stored in a clean, self-draining “water hose and fitting storage” at least at 45cm above floor.
- Use only clean, suitable and clearly marked (“potable water only”) hoses for bunkering potable water.
- Hoses shall be disinfected regularly to avoid growth of bacteria and further contamination.
- Install special water sampling faucets at all important places (at least one at each tank).
- Read and follow the maintenance instructions of all components of the drinking water system (e.g. hydrophor, hardener, calorifier, UV-Sterilizer and chlorination unit)
- If you use a UV-Sterilizer the lamp has to be cleaned and disinfected regularly. The lamp itself has to be changed from time to time according the manufacturer’s instructions. Keep in mind that the UV-method just works close around the lamp, so it should be installed in a water circulation system.
- If you produce your own water you need a well maintained hardener to avoid corrosion. Clean and refill it according the manufacturer’s instructions.
- Switch the calorifier to the right temperature (flow line >60°C, return line >55°C) to avoid growth of legionella in the system.
- Temperature of the entire cold water system should ideally be < 20°C but never > 25°C! (Isolation works!)
- Avoid stagnation of water in seldom used areas like hospital or unused cabins like owner or pilot cabin.
- Perform cleaning and disinfection of all aerators, shower heads and hoses from time to time to avoid built-up of biofilms and other vitiations in these parts.

- Perform a periodically hot-water-flush of all faucets and showerheads consecutively at 70°C for at least 3 minutes to kill legionella.
- You have to be able to measure the free chlorine level of the treated water and the pH-value because this will influence the effect of chlorination.

And here are some management suggestions:

- Before you start bunkering potable water, ask the supplier to show you his water quality report.
- Bunkering is a critical procedure. It is very easy to contaminate your system by dirty hoses or fittings so work always as clean as possible!
- Use a flushing schedule for seldom used parts of the installation to reduce growth of bacteria in stagnating water. On the right side you can see two samples. The left one before, the right one after flushing the system.

- If you open a faucet, wait a while (2-3 Liter) before you use the water to discard the “old” water.
- If you use a chlorination unit, check the free chlorine level with a suitable test at least daily. The level should be between 0,1 - 0,5 mg/l.
- If you need to disinfect the whole system, ask for professional assistance to avoid accidents.
- Organize a periodic, professional sampling of the drinking water. Keep in mind that each result is just a “snapshot” of the actual system status.
- To get an overview of the system we recommend to take one sample directly from the tank, one sample from a faucet at the bridge and one sample from a faucet in the hospital or in the galley.
- Record all analysis results accurately in a water management log so that it is possible to compare all results easily.

For more information about drinking water quality on board, we recommend the *WHO Guidelines for Drinking-water quality*. You will find a link to this source, to the related international standards and more information at www.hphc.de.

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Fresh water on board?

Why are water analysis reports important for your personal health?

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Potable water – a valuable good

Human beings consist to over 80% of water. So it is easily understandable, that humans need the frequent use of a safe water supply to exist. You can survive several weeks without any food, but you will die after a few days without drinking. So the first important step is to understand that clean drinking water on board is a very valuable good that needs your care.

Water systems are “living”

Drinking water installations are different to other technical systems. Of course, oil, fuel or other technical liquids can harbour microorganisms too, but it’s only the water that you use for taking a shower, for cooking or drinking. Water acts as a habitat for a lot of different microorganisms and reacts very sensitive to any contamination. It is normal to have bacteria in your drinking water and not all of them are, what we call pathogenic. That means, not all microorganisms in drinking water will cause problems after consumption and it is necessary to understand that the wish to get sterile water is not realistic. Even in specialized water treatment plants for hospitals, it is not possible to produce absolutely sterile water. So please realize that you are working with a “living“ system. You don’t believe? Check it! If you touch the inside of a water canister after a few weeks, you will feel a slimy surface. This slime is called “biofilm” and consists of a lot of different bacterias. You can find this biofilm in your drinking water system too, and calm down, it’s normal.

Keep in touch with your germs!

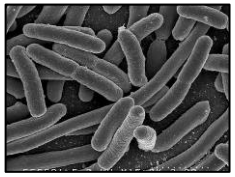
To be sure that there is no harmful contamination of your drinking water system, it is mandatory to perform a **professional** water analysis regularly. In Germany, ships need to be checked at least once a year. Some other flag states request more frequent analysis. Anyway, it is useful to know, that each analysis shows only the actual status of the water that can change in a few days from good to bad if you have any contamination (e.g. bunkering problems). Therefore it is necessary to have a very well maintained potable water system and a well organized water management. If you are interested in details of potable water management we recommend to visit the Vessel Sanitation Program at http://www.cdc.gov/nceh/vsp.

Sampling by professionals!

First question: Who is allowed to do this? Simple answer: Just professionals! You need a special training and specific equipment to perform a reliable water sampling. Therefore you should take care that only professionals which were trained by an laboratory working according **ISO-Standard 17025**, do take the samples. To support the procedure, it is very useful to have special sampling faucets at different places in the system. We recommend at least one faucet directly at each potable water tank. It has to be very clean, made of metal, without rubber gaskets and aerators and it should be clearly labelled with an identification number and the sentence: “for water sampling only” .

What is analyzed and why?

Escherichia coli

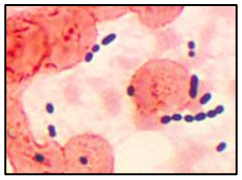


E.coli is present in large numbers in the normal intestinal flora of humans and animals. If you bring this bacteria into your body by drinking or eating E.coli can cause serious disease like urinary tract infections, meningitis and acute diarrhoea. It is easy to measure E.coli in water samples. We use the presence of this bacteria as an index for faecal contamination of the drinking water system. That provides an indication of other pathogenic faecal contaminants in the water. The threshold of E.coli is 0 / 100 ml.

Total coliform bacteria

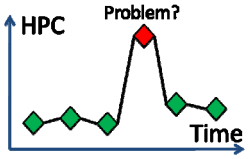
Total coliforms include organisms that can survive and grow in water, particularly in the presence of biofilms. The presence of total coliforms indicates inadequate water treatment. The threshold is 0 / 100 ml.

Enterococci



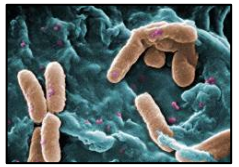
You find Enterococci in the faeces of humans or other warm-blooded animals. They are relatively specific for a faecal pollution. Important advantages of these germs are that they tend to survive longer in water environments than E.coli. So the presence of Enterococci provides evidence of recent faecal contamination and detection should lead to consideration of further action (e.g. further sampling, detailed investigation of potential sources).
The threshold is 0 / 100 ml.

Heterothrophic plate counts (HPC,CFU,KBE)



In a HPC analysis, the water sample is cultivated at 22°C and 36°C (to check the microbial growth in the water system and in human body). The cultivated microbial colonies are countable. The test has little value as an indicator of the presence of pathogens but can be useful in operational monitoring as a treatment and disinfectant indicator. The objective is, to keep numbers as low as possible. To get an overview of the system it is recommended to document all the values in a drinking water system log so that the health authority has the ability to compare the HPC values over the time like shown in the diagram above.

Pseudomonas aeruginosa



This bacteria is a common environmental organism that can multiply in water and on moist surfaces (e.g. sinks, showers, SPA-Pools). Pseudomonas aeruginosa can cause a range of infections. In warm moist habitats such as SPAs or Pools, it can lead to ear and eye infections. But it predominantly colonises damaged sites such as burn and surgical wounds, respiratory tracts of people underlying disease and physically damaged eyes. Ingestion of contaminated drinking-water is not an important source of infection. The main reason for analyzing this germ is the use of water in your hospital or sick bay.

Legionella

Legionella is a bacteria, responsible for legionellosis of which two clinical forms are known: Legionnaires’ disease and Pontiac fever. The former is a severe pneumonic illness. Pontiac fever is a milder, self-limiting disease with symptoms similar to those of influenza. The most common route of infection is inhalation of aerosols during taking a shower or using spas. There is no evidence of person-to-person transmission. Legionella can be found in a wide range of water environments and it proliferates at water temperatures between 20°C and 50°C. It is important to avoid this temperature range in the hot water system **and** in the cold water system as well!