

AQUASTERIL[®] – A Simple and Effective Mean for Water Disinfection

Major natural disasters, draught periods lasting a number of years, poor crop, industrial disasters, war and ethnic conflicts cause unpredictable situations, connected with human suffering in particular areas, countries and regions. Usually regions of so called developing countries are involved, with elimination of aftermath for which local financial sources and means are insufficient. Vast economic and social problems have then to be solved on international basis, in a form of perfectly organised and financed humanitarian missions, provided by governments and nongovernmental organisations.

Among essential needs of the population in effected areas we can name an urgent supply of the means for survival, immediately after the situation occurs. Mainly temporary shelters, clothing, blankets, drugs, foodstuffs are required and at last but not least provision of safe water in sufficient quantity and quality.

Thirst can be such intensive, that people are inclined to drink even water which is unsafe for the first sight, regardless the danger of health problems afterwards, caused by microbial and biological contamination, which is very likely to be present.

The results of scarcity of safe water are soon manifested not only with people who have developed a disease. Centres of infectious diseases appear, and may turn to epidemics in areas of larger concentration of population when any sources of safe water are available. Elimination of the centre is then very complicated and economically demanding (drugs, separation of those who are ill, securing sanitation of contaminated material and hygiene).

A decisive moment in planning every humanitarian mission is to specify which means should be used to supply the essential quantity of safe water in the shortest possible time after the occurrence of an extraordinary situation.

Transportation of safe water is often logistically difficult. Not always a sufficient number of mobile water tanks is in disposal and the accessibility of the effected place can be unsure. There is not any organised distribution system, including suitable storage vessels and mainly the safe water source may not suffice the pumped quantities.

There are various types of mobile water treatment units, capable to produce safe water. But their installation is predetermined by a sufficient electrical energy supply, abundance of operation agents, trained maintenance staff and the unit output proper. All these conditions have to be fulfilled to prevent humanitarian catastrophe.

Classical way of safe water preparation like boiling the water, is usually not applicable in larger scale, due to technical complexity (required amount of energy and long time for boiling and cooling).

One of the most effective ways of water disinfection is the elimination of microbial and biological growth, using chemical agents.

The use of iodine preparations (organically bound, crystalline or iodine solutions) is not the best option, due to health and sensoric aspects of long term application of the water treated by this technology (content of iodine substances exceeds the recommended daily consumption concentrations).

With chemical treatment, the use of yet unsurpassed, excellent active chlorine can be added to water in a number of substances in solid state (powder, granulated) or in tablets or solutions. However, when applying chlorine as an active disinfectant the problem of taste and odour has to be taken into account. These effects are present any time we use sufficiently high, effective dose. The higher the dose of chlorine for safe disinfection is added, the higher the concentration of unreacted chlorine remains in the final output water, with unpleasant taste and odour. Therefore the dose of active chlorine, supplied in various kits for water treatment, is relatively low (approx. 5 to 10 ppm). Hence, the absolute effectiveness (100%) cannot be secured and represents a compromise between the real requirement of universally safe dose (in the order of tens of ppm of chlorine) and the usability of resulting water for drinking.

Recently, thanks to complicated research programmes, conducted by some world leading manufacturers of water treatment kits have outlined new ways of effective solution of the problem. Attention is paid to lowering or removal of the traces of chlorine in the final water, utilising dechlorination filters (with activated carbon), or chemical agents having dechlorination properties (e.g. sodium sulphite). The above mentioned filters are apt to secondary microbial contamination and the water containing sodium sulphite exhibits sensoric problems.

A specialised team of the Czech company **AQUA PLUS Ltd.** has been carrying out research into technologies of water treatment for emergency water supplies for a number of years. One of the remarkable, positively tested outcomes of successful activities in the disinfection of water is the technology is manufactured under the registered trade mark **AQUASTERIL®**.

The principle of **AQUASTERIL®** technology is based on a combination of the effect of active chlorine, applied in high doses (approx. 40 to 50 ppm) and subsequent dechlorination using a vitamin preparation. **AQUASTERIL®** technology is capable of a 100% elimination of germs, viruses and parasites contained in the raw water, regardless the conditions of disinfection (quality and parameters of the treated water) and on the state of vessels, where the disinfection is carried out (the walls of a vessel are repeatedly sterilised during the next use). By adding the dechlorination agent the residual chlorine is converted into harmless chlorides (similar to kitchen salt).

The resulting drinking water has no traces of chlorine and the unreacted residuals of the dechlorinating agent in the final water do not exhibit any unpleasant taste or odour properties. Moreover, the presence of the vitamin preparation is regarded as positive, from the health point of view.

Very important advantage of using **AQUASTERIL®** kits, contrary to other means, is the applicability in developing countries, its simplicity of use, even for the illiterate and unqualified people. Each kit is accompanied by the instructions for use in a written text and also in pictorial form, making the application easily understandable.

The guaranteed effectiveness lifetime of *AQUASTERIL*[®] kits is at least five years (5), capable to withstand even extreme climatic conditions.

The disinfection kits, based on *AQUASTERIL*[®] technology, were tested on microbially and biologically contaminated waters in dozens of countries on four continents. The treated water was always disinfected with 100% efficiency. Moreover, even relatively resistant organisms, like species causing schistosomiasis, in large East African lakes (Lake Victoria, Lake Tanganyika), parasites and worms in the Senegal River, helminths in the Nile delta, etc. Laboratory tests, run at Milano University (Italy) proved at the same time excellent effectiveness to high concentrations of, e.g. Salmonella paratyphi A, Shyella somnei ATCC and resistant spores of Bacillus cereus var. Mycoides.

To secure a wide applicability of *AQUASTERIL*[®] kits for various population groups, the kits are manufactured in four basic versions, according to the volume of water to be treated:

- ***AQUASTERIL*[®] 2 EXTREME** kits for disinfection of water in bottles in the extreme climatic and operational condition
- ***AQUASTERIL*[®] 20 CAMP** kits are designated to treat water in larger vessels (20 litres)
- ***AQUASTERIL*[®] 1000 WELL** kit disinfects water in cubic meter volumes.

The main advantages of the AQUASTERIL® sets:

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- **AQUASTERIL®** technology is capable of a 100% elimination of germs, viruses and parasites contained in the raw water, regardless the conditions of disinfection (quality and parameters of the treated water) and on the state of vessels, where the disinfection is carried out (the walls of a vessel are repeatedly sterilised during the next use). By adding the dechlorination agent the residual chlorine is converted into harmless chlorides (similar to kitchen salt).
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- The guaranteed effectiveness lifetime of **AQUASTERIL®** kits is at least five years, capable to withstand even extreme climatic conditions.
- To secure a wide applicability of **AQUASTERIL®** kits for various population groups, the kits are manufactured in three basic versions, according to the volume of water to be treated.