

HUBER SafeDrink® Drinking Water Supply



The way to a better living

Water – The Essence of Life
But Elusive to Many



➤➤ The situation:

Drinking water is our most important resource. Pure drinking water is the basis of any economic and cultural development and a healthy and peaceful population. But in many areas of the world the supply of clean drinking water cannot be guaranteed.

In many of these areas the problem is not a lack of water but poor raw water quality and the unavailability of suitable treatment technology.

Surface water is a mix of ground/spring/rain water and (treated or untreated) wastewater, with a permanent input of turbidities, pesticides, pathogenic germs, toxic and chemical pollutants.

The HUBER SafeDrink® process allows for a safe, easy and reliable removal of these polluting substances. The result is a drinking water quality that complies with WHO recommendations or is even better.



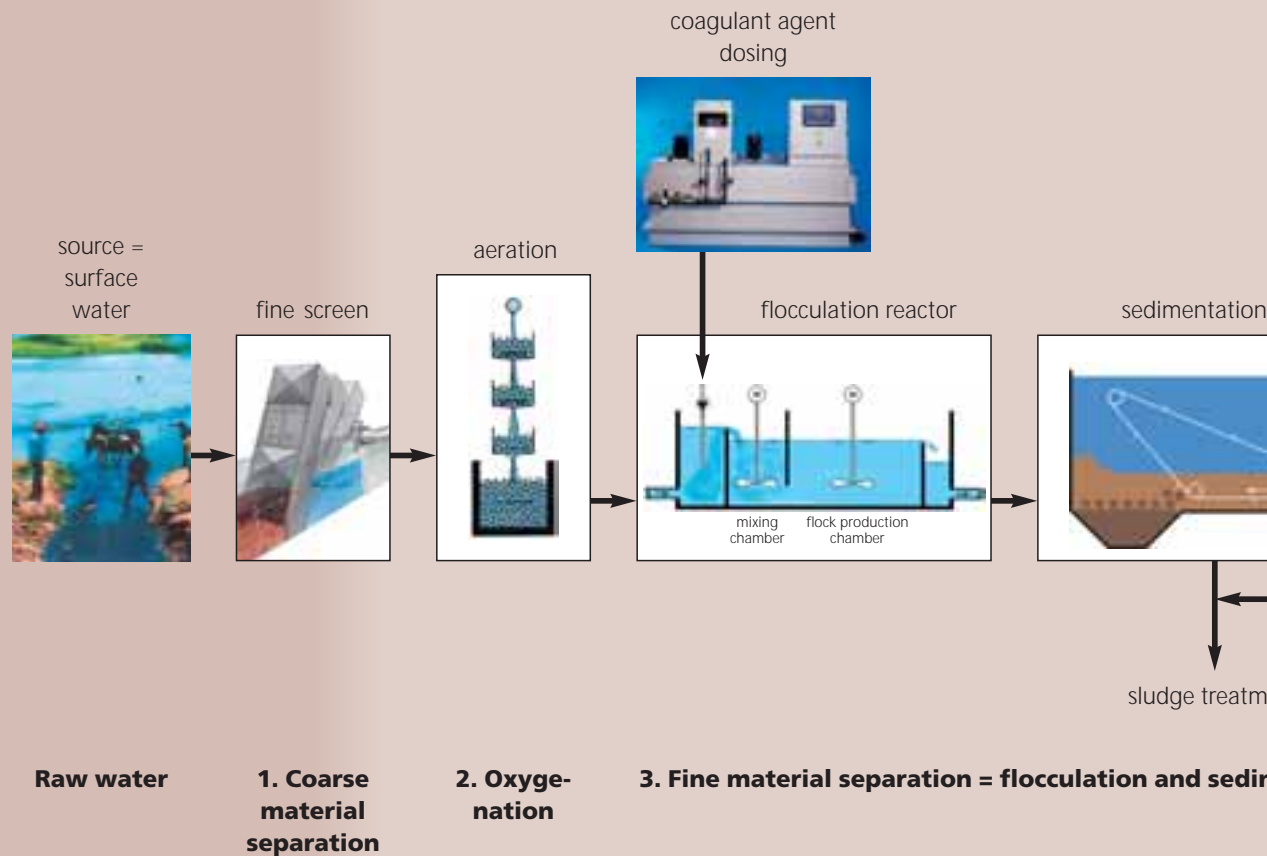
➤➤ The Solution:

HUBER SafeDrink®

HUBER offers different treatment systems to provide clean and healthy drinking water in order to meet the requirements of different surface water qualities and customer preferences.

The basic principles of this treatment process are (see also flow diagram below):

➤➤ From foul water to potable water



1. Coarse material separation

The aim of this treatment step is to remove coarse particles and floating material from the raw water. This is achieved with an automatically working mechanical HUBER screen.

HUBER screens: Applicable for small up to very high flow rates, available with any bar spacing

2. Oxygenation

A simple cascade increases the content of dissolved oxygen so that material like iron, manganese, nitrogen compounds and organic compounds are oxidised, which supports the following flocculation process and thus reduces the coagulant agent demand and finally operating costs.

3. Fine material separation: flocculation and sedimentation

Sedimentation by flocculation makes fine solids contained in the water settleable and filterable, demanding only a low amount of coagulant agent.

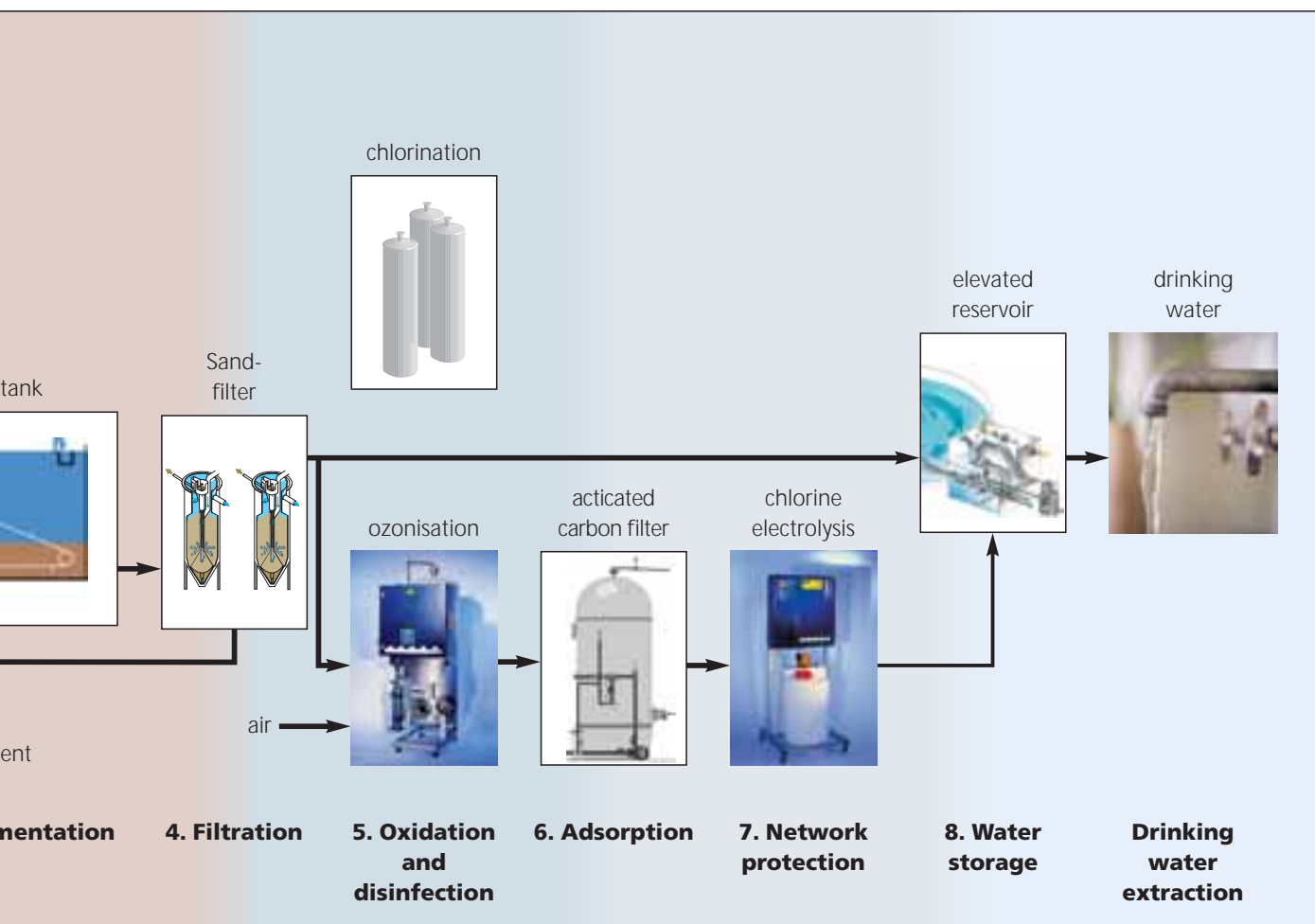
The flocculated solids settle in the subsequent typically rectangular settlement tank equipped with flow-optimised HUBER inlet and outlet structures and the HUBER Scraper System, prior to being discharged.

4. Filtration

After such pre-treatment the raw water is suitable for further treatment steps, including separation of the filterable flocks by means of the continuously and fully automatically operating HUBER CONTIFLOW® Sandfilter.

The HUBER CONTIFLOW® Sandfilter offers the following benefits:

- Reduced maintenance – High availability
- Virtually maintenance-free
- Continuous operation – No process interruption required for backwashing
- Consistent filtrate quality
- Simple wash water treatment – Reduced wash water production
- Low pressure loss



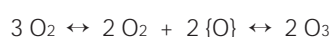
5. Oxidation and disinfection

The HUBER SafeDrink® water treatment system uses one of the most advanced and effective disinfection techniques, which completes the HUBER SafeDrink® process.

Ozonisation

Ozone is used for disinfection in place of chlorine to avoid typical problems of chlorine application, such as malodour and change in taste. Ozone as a pure oxidant additionally prevents other disadvantages occurring with chlorine, such as the production of cancer-causing trihalogen methane and inevitable chlorine overdosing.

As ozone is however unstable due to its high reactivity and thus not storable, ozone must be produced where used. This is achieved with an ozone generating plant that ideally uses a part of the atmospheric oxygen for conversion.



The bactericidal and particularly viricidal effect of ozone is superior to all other disinfectants. Due to its high oxidative and disinfective properties the use of ozone is most reasonable for difficult-to-treat water with a very high pollution load.

Substances oxidisable with ozone are COD, adsorbable organic halogen compounds (AOX), Fe, Mn, CN, polychlorinated dibenzodioxins, furan (PCDD/PSDF), crop protection agents and pesticides (PSM), ethylenedinitrilotetraacetate (EDTA), hydrogen sulphide (H₂S), CHC, polycyclic aromatic hydrocarbons (PAK), colouring substances, etc. The drinking water quality is thus assured under any conditions.

Advantages of ozonisation

- Quick-acting oxidation
- Most effective disinfectant
- Decolorisation of humic material containing water
- Removal of organic and inorganic material
- Destruction of smelling substances
- No handling of harmful chemicals required
- No transport risks due to production on site
- Easy to operate and reliable
- No harmful or cancer-causing byproducts

The disinfection efficiency of ozone is about 20 times the efficiency of chlorine.

Disinfection with ozone is consequently the best method under health aspects.

Chlorination

An alternative disinfection method applicable with the HUBER SafeDrink® process is chlorine disinfection.

Chlorination is still the most common disinfection method for many centralised water supplies as the costs for both the required equipment and installation are lower.

The following chemicals have proven their suitability in practice:

- Chlorine gas
- Chlorine dioxide
- Chlorinated lime
- Sodium hypochlorite
- Sodium hypochlorite solution
- Calcium hypochlorite

6. Adsorption

Activated carbon filter

After ozonisation it is necessary to have a charcoal absorber. HUBER uses the highly efficient activated carbon as an adsorbent agent for the SafeDrink® process.

- Adsorption and degradation of residual oxidants (residual ozone, etc.)
- Removal of pre-oxidised organic material and dissolved substances
- DOC degradation up to 85%
- Removal of humic material and halogenated hydrocarbon
- Removal of odour

7. Network protection

To keep the drinking water obtained with above described treatment free of germs while transported through the pipeline network and prevent regrowth, a small amount of chlorine is added.

The safety dose of chlorine lies usually below 0.1 g Cl₂/m³.

To keep the risks associated with handling of chlorine as modest as possible, it is recommended to produce chlorine on site from sodium chloride (common salt) by means of chlorine electrolysis:



8. Water storage

The purpose of water reservoirs is primarily to balance the supply and demand of water. Another duty of water reservoirs, in addition to equalisation of varying consumption, is to cover special seasonal consumption peaks, for example.

Storage of drinking water without treatment is limited to several days (max. 1 - 2 weeks) before discharge into the pipeline network, depending on the type of water. For quality reasons drinking water is stored in closed reservoirs.

- Elevated reservoirs
- Water towers
- Earth reservoirs
- Caves
- Air-pressure tanks

Water reservoirs are the most important technical form of all available water storage options.

Hygiene in drinking water reservoirs

To ensure pressure equalisation during filling and water extraction, openings must be provided to allow air to stream in and out. Air contains organisms, such as germs, spores, pollen and fungi, which may germinate in the water and make it unsuitable for consumption.

To eliminate the risk of germination, the air for pressure equalisation in the reservoir must be filtered. HUBER offers the following system for this purpose:

Modern high-efficiency air filters made of hydrophobic material do not provide a breeding ground for micro organisms and guarantee hygienic and clean air in water reservoirs so that germination of the water is prevented.

An optimally working air filter plant gives the operator of drinking water reservoirs the necessary safety that germination through polluted air is reliably prevented.

➤➤ Safe drinking water supply

Burglary, vandalism and terrorist attacks pose a threat to drinking water supply. Even minimal criminal energy may cause serious damage. Special protection of drinking water supplies is therefore a focus of attention. Relevant safety-engineering aspects should be taken into account when it comes to new projects or modification of plants. HUBER offers a whole range of products that are able to reduce the exposure dramatically.

- Burglar-proof doors
- Burglar-proof aeration systems
- Burglar-proof windows and manhole covers

For virtually perfect security an electronic monitoring system is available as an additional option.

➤➤ Advantages of the HUBER SafeDrink® System

- Treatment process and products from one source
- Easy to install and operate system
- Minimal maintenance costs
- Clean and healthy drinking water
- Safe supply of drinking water
- Suitable for any raw water quality and any flow rate

➤➤ Case Study

The villages of Dongula City and El Dabba in the Northern territories of the Democratic Republic of Sudan were suffering a serious lack of clean drinking water. The nearby river Nile would be a huge source of drinking water but the quality is not according to WHO. A total of almost 70.000 people are suffering the consequences of unhealthy drinking water.

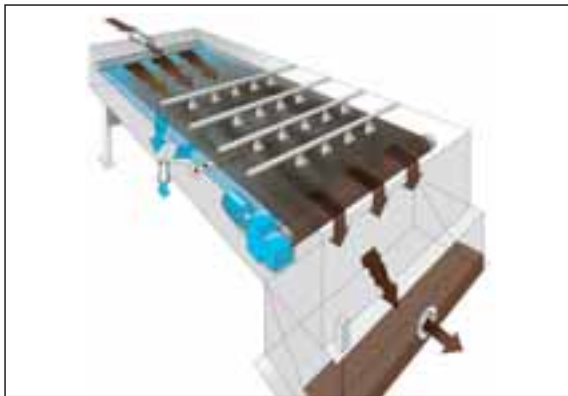
HUBER is supplying HUBER SafeDrink® water treatment processes for both cities to produce a volume of 3.500 m³/d each.

The tiny villages of Barsa and Argi, also in the Northern territories of the Democratic Republic of Sudan, had the same problem. For its population of around 1.500, a compact HUBER SafeDrink® water treatment system with UV disinfection and a flow rate of up to 100 m³/d guarantees the supply of clean drinking water to the households.

With an investment of less than 20.– Euro/person the HUBER SafeDrink® process offers an affordable and reliable solution for many areas.

➤➤ Sludge Treatment

Drinking water treatment plants produce sludge-containing water and sludge that needs to be treated prior to disposal, the amount and quality of which depends on the individual water treatment method,



whether for example iron flocculation, aluminium flocculation or softening/deacidification.

HUBER machines and their benefits

HUBER offers several solutions for treatment of drinking water sludge:

➤➤ Sludge thickening:

HUBER Drainbelt DB and Twinbelt TB

The HUBER gravity belt thickeners offer efficient and economical sludge thickening with a high thickening result of 6 - 8 % DS and a high throughput capacity, operate fully automatically and are easy to maintain.

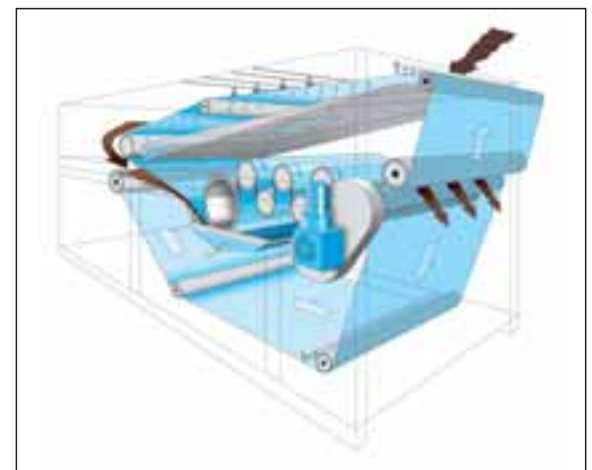
➤➤ Sludge dewatering:

HUBER Bogenpress BS

After conditioning the sludge is fed onto the belt filter press to be dewatered. Depending on the sludge quality, the Bogenpress achieves a result of 17 - 20 % DR.

Advantages of the HUBER Bogenpress BS:

- High dewatering efficiency
- Economical operation due to the low polymer and energy demand
- High separation efficiency – Clear filtrate



Centrifuge

The centrifuge combines two principles of solids/liquid separation: sedimentation and centrifugal force, which accelerates solids sedimentation. The maximum solids content achieved lies between 25 % and 35 % DS.

Advantages of the HUBER ROTAMAT® Centrifuge RoD:

- Completely made of stainless steel
- Fully automatic operation – minimal attendance

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Subject to technical modification

Drinking Water
Supply SafeDrink®