

Welcome

New drinking-water treatment plant for the municipality of Schmitten (Switzerland)

**CONGRATULATIONS**

**Official opening of the new drinking-water treatment plant**

Drinking water is the most vital substance our bodies need there simply are no substitutes. One of the most fundamental duties of a local authority is therefore to ensure that water is supplied at drinking-water quality.

The municipality of Schmitten has met this obligation in an exemplary fashion by its investments in the water catchment facility, the pumping station and the treatment plant. Schmitten, in its selection of which water treatment system to use, has also been courageous in treading new paths. Ozone-based water treatment by the HYDROZON® process is one of the most modern and safest conditioning processes. The upstream sedimentation step is the only representative of its type in the canton and probably in the whole of Switzerland as well. Furthermore the compact design of the system meant that it was also possible to build the water treatment works at a very reasonable cost.

As contractors for the field of water delivery and treatment we offer our sincere congratulations to the municipality and wish it every enjoyment of the new quality of its drinking water. At the same time we should also like to express our appreciation of its trust in our company and for the dedicated cooperation of all other companies involved in the project. It was a pleasure to work here.

Bruno Bachhofer, Managing Director

**OZON - BASED WATER TREATMENT SYSTEM WITH FLOCCULATION STAGE**

**Water: the irreplaceable source of life**

The latest technology is ensuring that the municipality of Schmitten gets best drinking water following ozone-based conditioning and filtration. The official opening took place after some months of successful trial operation.

Schmitten has water coming out of its ears if you just look at the overflow of the water catchment spring. This water is, however, karstic water which is subject to very marked fluctuations in both quantity and quality.

The main problem is not only the high levels of turbidity encountered both during the snow-thaw period and when there is heavy rain but also the contamination of the water with coliform bacteria and fecal streptococci which is usually associated with this. Fig 1 shows the typical progress of turbidity over an extended period of time with peak values of up to 400 TE/F being measured (reference value = 1).

In other words the treatment process must be able to cope with these extreme fluctuations. In conjunction with consulting engineers Hasler-Mügler-Quinter AG a pilot test lasting several months was therefore conducted in the summer of 1999 (see Fig 2).



Fig 2: Pilot sedimentation facility under canvas

Thanks to the pilot plant much valuable information was also gained for the final dimensioning of the system. Immediately upon completion of the pilot phase the consulting engineers commenced the planning of the final version of the water treatment plant. This meant that completion of both the construction of the building carcass and also the pipework installation was achieved as early as summer / autumn 2000 (Fig. 3).

The fact that no interruptions to

the water supply could be permitted during the entire rebuilding program meant that special steps had to be taken.

**Supply system**

The main components of the water supply system are the spring storage shaft, the spring pumping station, the treatment plant, the water reservoir and the pipe network. The water flows down an open-air slope from the spring central shaft to the pumping station, which has been renovated and equipped with new



Fig. 3: Installation of the Hydro-Clear

and more efficient pumps. These pumps raise the water the necessary 60 m to the treatment plant.

**Treatment system**

The main components of the treatment system are the Hydro-Clear sedimenter, the TWK 30/S20 ozone-based compact drinking-water unit and a settling basin. All of these components were manufactured in the factory from high-quality stainless steel. This means a long service life is guaranteed for the system. (For a functional description, please turn over.)

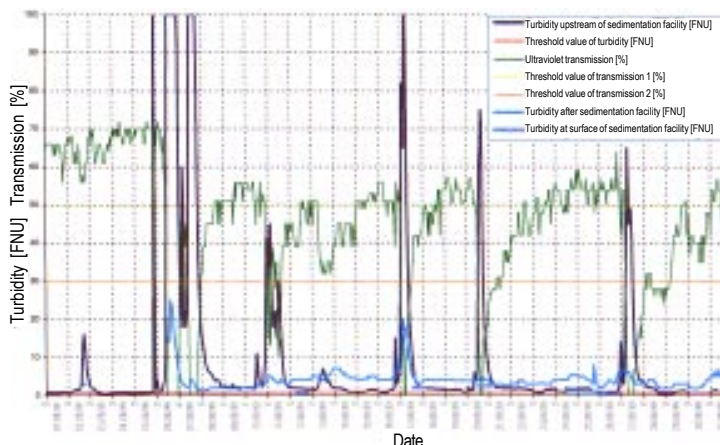


Fig 1: Turbidity of untreated water and ultraviolet transmission

**DATA & FACTS**

**HYDRO - CLEAR:**

(=> sedimenter)  
Capacity: 15 m<sup>3</sup>/h  
Diameter: 3200 mm  
Height: 3000 mm  
Flocculant: iron (III) chloride

**COMPACT DRINKING WATER UNIT**

Capacity: 20 m<sup>3</sup>/h  
Filter diameter: 1600 mm  
Zylindrical height: 2500 mm  
Filtration rate: 7-10 m/h  
Quantity of ozone: up to 90 g/h

**SETTLING BASIN:**

Volume of clear water: 9 m<sup>3</sup>  
Sludge volume.: 3.5 m<sup>3</sup>  
Diameter: 2500 mm  
Zylindrical height: 2500 mm

**SPRING WATER PUMPING STATION:**

Number of pumps: 2, working alternately  
Pumping capacity: each = 15 m<sup>3</sup>/h  
Pumping head: 60 mWs  
Power consumption: each = 5.5 kW

OZONE ENSURES THAT THE MUNICIPALITY OF SCHMITTEN HAS CLEAN, GERM-FREE WATER

# Perfect drinking water thanks to the latest technology

## Why do we need water treatment?

Water treatment is required where the natural protective and cleansing capabilities of the water-bearing covering stratum are not adequate to guarantee a constant drinking water quality. This deficiency is filled by the HYDROZON® compact drinking water units (see Fig. 4) which, in ways very close to nature herself, condition the contaminated water in order to produce good drinking water.



Fig. 4: Compact drinking water unit with control cabinet and ozone generator module

## Flocculation

The first step in water treatment is flocculation. By flocculation is meant the precipitation of the

finest particles. In this step a so-called flocculant is added to the water and this equalizes the electrical charges at the surfaces of the solids in the water and thus permits the formation of floc-

## Ozonization

Once the untreated water has passed the flocculation stage it is treated with ozone. Ozone disinfects the water, oxidizes traces of dissolved iron and

The water, which now contains ozone, next flows into the contactor which contains filler elements (perforated stainless-steel cylinders). These filler elements improve the reaction

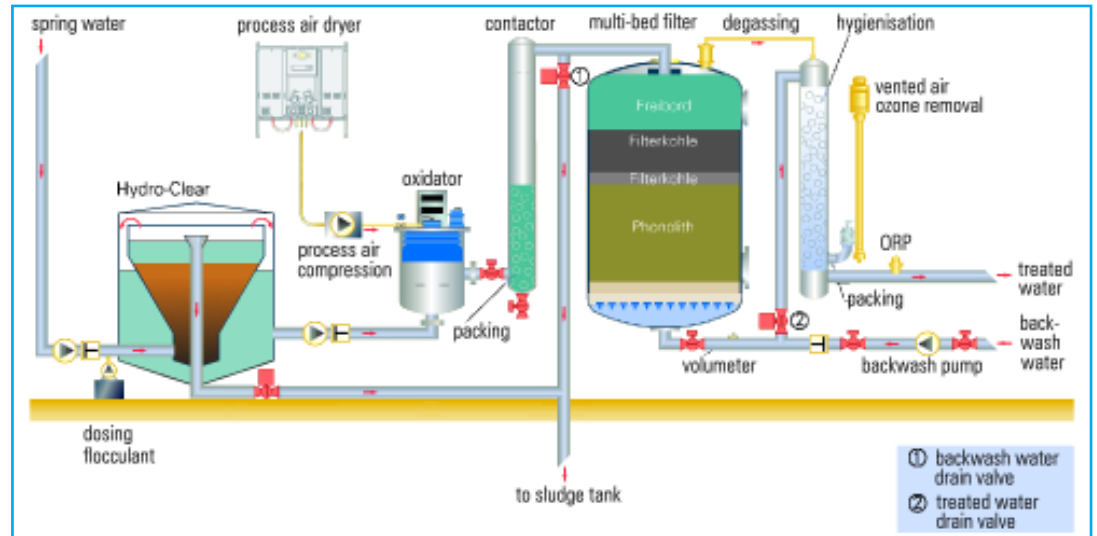


Fig. 5: Simplified process diagram of the Schmitten drinking-water treatment plant

cules. In many cases these floc-cules can be caught directly during the filtration stage. Due to the enormous fluctuations in turbidity in Schmitten's spring water a sedimentation stage was installed in this plant upstream of the filter.

This facility, referred to as the Hydro-Clear, is how-ever only switched on during periods when there is a high level of turbidity. At turbidity levels below 20 TE/F or so the untreated water can be pumped directly via the compact system.

manganese and results in the breaking-up of organic compounds such as are found in humic matter. The ozone generator, however, may only be operated with absolutely dry air. In the process air dryer the humidity of the ambient air is therefore brought down to around 1-2% residual humidity.

## Mixing

The ozone-air mixture is mixed into the water by means of a special high-performance venturi / injector combination.

between the ozonized air and the water.

## Filtration

In the filtration stage excess ozone is removed from the water and both suspended and oxidized impurities in the water are retained in the filter material. The filter is cleaned by regular flushing of the filter material with treated water in the opposite direction and at high speed. A further ozonization of the filter outflow hygienizes and stabilizes what is now drinking water.

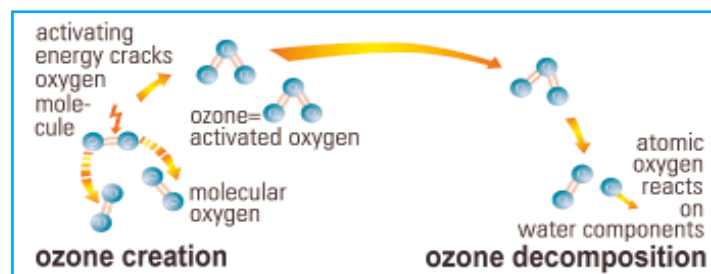
## OZONE: WHAT IT IS, WHERE IT COMES FROM, WHAT IT DOES

# Ozone as an efficient disinfectant for water purification

Ozone is activated oxygen. It is created by the effect of activation energy on molecules of oxygen. In the natural world this energy might be provided by a flash of lightning, for example. In the case of artificial generation in the ozone generator the requisite energy is supplied by strong electrical fields (high-voltage fields). The correct technical term for this process is corona discharge or even dark electrical discharge. In this way atomic oxygen is created in the high-tension field from the normal molecular oxygen and this

atomic oxygen immediately attaches itself back onto an oxygen molecule by a double bond. This substance is referred to as ozone. However, ozone is not chemically stable and breaks up, releasing the oxygen atom. The

reaction of this free atom of oxygen with the impurities in the water or its penetration into living organisms is what is ultimately responsible for the disinfective and oxidizing effect of the ozone.



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### Publisher

Hydro-Elektrik group  
Angelestraße 48/50  
D-88214 Ravensburg  
Telephone +49 (0) 751 / 6009 - 0  
Fax +49 (0) 751 / 6009 - 33  
info@wasseraufbereitungssysteme.de



### Editor

Manfred Brugger  
redaktion@wasseraufbereitungssysteme.de

### Layout

Silvia Mesmer

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