CRYSTAR® FT CERAMIC MEMBRANE FILTERS
for pool water preparation
For the preparation of water in public pools traditionally sand filtration is used in combination with additional process steps. This well and long established technology is outstanding due to small water consumption, but exhibits some impairment in terms of filtration efficiency regarding micro-organisms. Therefore, ultrafiltration with polymer membranes has been increasingly used for a couple of years for pool water preparation purposes. The ultrafiltration membranes provide a physical barrier for bacteria and viruses in the nanometer-scale, thus resulting in a very good water quality. Unfortunately, the use of ultrafiltration systems leads to higher water consumption in many cases, which leads to an undesired increase of the operating costs for the pool operator.

Crystar® FT Ceramic Membrane Filters for the preparation of pool water in public pools, together with additional process steps, uniquely combine the advantages of small water consumption and high water quality and represent a real and new alternative to the known filtration techniques.

Crystar® FT Ceramic Membrane Filters for the preparation of pool water in public pools are a further development of Saint-Gobain’s diesel particulate filters, which are used in the automotive business.

Crystar® FT Ceramic Membrane Filters for the preparation of pool water in public pools are operated in dead-end-mode, which means, the complete pool water has to pass the porous, filtration-active membrane, ensuring that all particles are held back by the membrane.

ADVANTAGES OF CRYSSTAR® FT CERAMIC MEMBRANE FILTERS

The use of Crystar® FT Filters ensures the following advantages:

- high efficiency
- excellent chemical robustness
- effective disinfection
- reduced chlorine consumption
- without pH-restrictions
- compact design
- physical barrier for bacteria and micro-organisms
- long service time
- high flux
- simple cleaning
- small operating costs

An important advantage of Crystar® FT Ceramic Membrane Filters for the preparation of pool water in public pools is their ability to be cleaned even under extreme chemical conditions (e.g. at pH 0.5 and pH 13.5). After such cleaning the filters are practically in “as delivered”-state, again. If the filtration system design supports this, the filters can remain mounted in the system for the chemical cleaning and are ready for filtration immediately afterwards (CIP = “Clean In Place”). Due to the outstanding material properties of silicon carbide, the chemical cleaning can be repeated as often as required to ensure a long service time.
The Ceramic Membrane Filters consist completely of re-crystallized silicon carbide (RSiC). This material was developed in the laboratory to resist even extreme mechanical, thermal and chemical stress.

The carrier material is extruded to monolithic honeycombs and the channels are alternatingly closed with plugs similar to diesel particulate filters in the automotive business. The material exhibits a very high open porosity beyond 40% and a multitude of big pores in the range of 5 micron pore size. This guarantees an excellent permeability for the filtrate.

Fired at temperatures beyond 2000 °C the carrier reaches its final mechanical and chemical robustness.

For the filtration of pool water membrane material with pore sizes of 250 nanometers is used, which provides a physical barrier for bacteria and microorganisms, e.g. cryptosporidia.
Crystar® FT Ceramic Membrane Filters for the preparation of pool water in public pools have been installed for the first time in Germany in the municipal Public Pools of the City of Roedental.

The pool water preparation in the Roedental pools consists of three main components: microfiltration for the removal of particulate matter, UV-treatment for the removal of chlorine disinfection by-products and inactivation of germs and viruses and hydrochloric acid electrolysis for the production of chlorine for the disinfection of the pool water.

Swimmer and non-swimmer pool exhibit individual pool water preparation systems. The microfiltration systems consist of two filter blocks, each, which can be operated individually.

The pool water enters into the inlet channels, which are open on the top of the filter and closed on the bottom, penetrates the membrane, which is coated onto the inlet channels, and leaves the filter monolith through the outlet channels, which are open on the bottom side, similar to the principal function of a diesel particulate filter. Along with the formation of a filter cake on the surface of the membrane, even particles smaller than the membrane pore size can be filtered from the water effectively.

The filtration process is operated in vacuum mode. The pool water is sucked through the filters, which are standing upright, by applying vacuum from the filtrate side, which is below the filters. Thus, an optimal usage of the filtration area is secured.

The filtration efficiency is designed in such a way, that the removal of bacteria and fungi, as well as other particles from the pool water, is ensured. Viruses will be partly held back by the filter cake forming on the membrane; they will be inactivated by the UV-treatment according to the system design.

The mounted filters can be chemically cleaned at elevated temperatures, after separation of the filter blocks from the pool water circuit by automated valves, thus reaching their as-delivered condition as often as required.

Both pool water preparation systems are operated by a central electronic control system, which ensures automated operation.
TEST RESULTS
CRYSTAR® FT CERAMIC MEMBRANE FILTERS

Before opening the pools to the public a six-day test swimming campaign with ca. 1200 voluntary swimmers was performed to prove the principal qualification of the system for pool water preparation. The program was controlled by the local hygiene authority and followed by an accredited water analysis laboratory. Additionally, a team of specialists from the TU Dresden measured water quality parameters exceeding the requirements of DIN 19643. After all requirements of DIN 19643 were proven to be met, permission to open the pools to the public was given.

The pool water preparation systems in the Roedental Public Pools have been operated permanently since March 2012. Water quality has been monitored by an accredited water analysis lab ever since according to DIN 19643 in direct contact to the hygiene authority. Starting with daily analyses of the water quality, the control cycles had been prolonged later to weekly and monthly measurements.

Since January 2013 the Roedental Pools are in a normal observation mode like any other pool.

The microbiological requirements of DIN 19643 have been fulfilled at any time.

Combined Chlorine and Trihalomethanes in chronological sequence (swimmer pool)

Combined Chlorine and Trihalomethanes in chronological sequence (non-swimmer pool)
Saint-Gobain IndustrieKeramik Rödental

integrated in the Compagnie de Saint-Gobain, Paris, France. Compagnie de Saint-Gobain is an international business group located in 46 countries. It is one of the 100 largest industrial companies in the world and has a leading position in all its strategic business areas.

Saint-Gobain IndustrieKeramik Rödental

has more than 150 years of experience in the production of high performance materials and its trademarks are internationally recognized.

Saint-Gobain IndustrieKeramik Rödental

has a strong customer- and employee-oriented philosophy. We are committed to each of our business partners and realize the absolute importance of a good cooperation. We have representatives all over the world that are ready to help you with your questions and needs.

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