www.hydro-watertreatmentsystems.com

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MEMBRANE TECHNOLOGY

EDITORIAL

Membrane filtration - the non-plus-ultra?

The term membrane filtration covers various processes. The processes differ in terms of the size of the pore diameter of the membranes, which determine extent to which the various water contents are held back.
Ultrafiltration, nanofiltration and reverse osmosis are of interest for drinking water treatment. After the initial enthusiasm about the new technologies, a certain amount of sobriety has since set in.
Right from the outset, Hydro-Elektrik GmbH has been critically examining the subject of membrane technology, because the disadvantages were either not discussed at all or only in passing.
Membrane technologies can be very appropriate or even nece-

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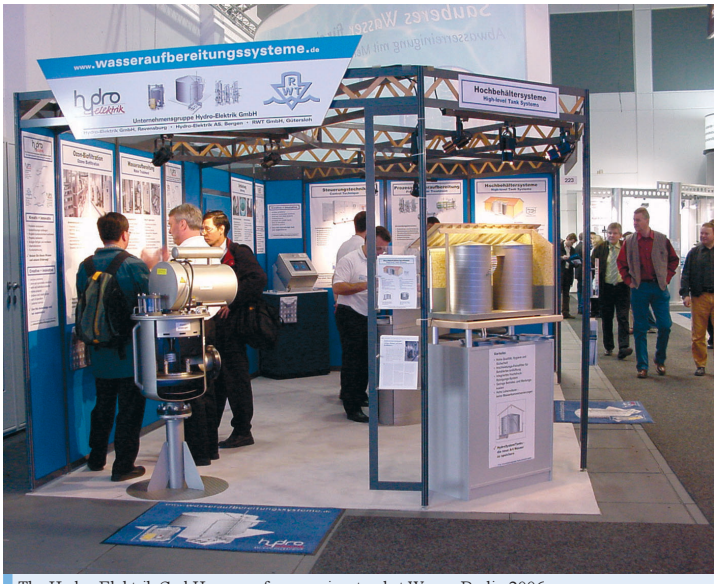
TECH TALK

WASSER BERLIN 2006

Trade fair success in Berlin

The products of the Hydro-Elektrik GmbH group of companies were a subject of great interest at the Wasser Berlin trade fair. In 2006, Hydro Elektrik was for the first time represented at Germany's largest water trade fair with its own information stand.

The stand had a friendly, informal and individual design. The centrepiece was the already very successful stainless steel container system, which proved extremely popular at the trade fair.
However, other products such as those for water treatment were also of interest to visitors. Around ¾ of the stand's visitors came from Germany.
Stand manager Manfred Brugger: 'The trade fair was an excellent platform for bringing our products to a large trade public and for forging many new contacts'.
In addition to the actual presence of the Group, the employees were also able to get excellent information and make a wide variety of contacts.



The Hydro-Elektrik GmbH group of companies stand at Wasser Berlin 2006

NEWS

www.myrwt.de

The RWT Internet presence gets a new makeover

For years, RWT GmbH has had an informal showcase site on the World-Wide Web. The introduction of a content management system (CMS) facilitating maintenance of the contents was linked with a comprehensive relaunching of the site.

RWT GmbH was among the first medium-sized companies to have its own site on the Internet.
However, its existing presence had been out of date for a long time. Nor was it a simple matter even to maintain the data. That's why, by changing over to a Content Management System, the visual appearance of the Hydro-Elektrik GmbH site has now been realized. In addition, the contents have been considerably expanded, with some of the information being made available only to registered users.
The new system is clearer and now also has a search function.
The automatic creation of an easy-to-print document view is an excellent feature. Quite intentionally the site does not include any animations or other tedious bells and whistles. Instead the site should impress by loading rapidly and by its informational content.
The content management system (CMS) makes editing and maintenance of the site contents easier. This ensures that the site is kept right up to date for the site

users. In the password-protected part of the site, registered users can access and download further information. Users can register directly from the site page. Access data are then sent by email.

NEWS & TRENDS

THE ALUMINIUM CONTENT OF DRINKING WATER

Scientists at Keele University in Staffordshire have discovered that the regular intake of mineral water can reduce the levels of aluminium in people with Alzheimer's disease.
Aluminium is suspected of playing a significant role in the development of Alzheimer's disease.
Drinking water suppliers should therefore reduce the amount of aluminium in drinking water to a minimum. Hydro-Elektrik GmbH has the technology available to do this.

BEER IS CHEAPER THAN WATER

At some supermarkets in Scotland, beer is sold at prices around 30 % lower than table water (source: Glasgow's Daily Record).
According to the article, beer only costs approximately 74 Cents, while water costs around 99 Cents.

TAP WATER IS A POPULAR DRINK

According to the results of a representative survey in Switzerland, the number of 'tap water' drinkers has increased by 10% over the past 5 years. Around ¾ of Swiss drink water directly from the tap every day.

MEMBRANE TECHNOLOGY

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ssary e.g. in reverse osmo-sis for saltwater desalination. An overall observation is, particularly in ultrafiltration and in nano-filtration.

Membranes do not act selectively, which means that in nanofiltration it is not just the unwanted substances that are removed from the water, but the desired materials too.

A decision must also be made as to whether the achievable degree of purity is even necessary for the drinking water supply, because the water still has to cover an additional distance on its way to the consumer.

In addition, there is the fact that membrane technologies are not possible without expensive chemicals, that compared with conventional methods waste water quantities can be up to 10 % of the useable water quantity, and that the service life of the membranes is limited, which means that a membrane replacement represents a significant expense.

In particular however, it is the operating costs that can be higher by a factor of 10 than with conventional technology.

In the industrial sector, excellent results can be obtained with membrane technologies, particularly in the extended sewage treatment.

However, good successes can also be achieved with membrane technologies in the production of demineralised waters.

In the drinking water supply, it has become apparent that, especially in the case small plants, ultrafiltration is an economical method.

Membrane filtration is just one process among many.

In water treatment plant design, Hydro-Elektrik GmbH will continue to weigh up the respective pros and cons of all possible process combinations and offer the customer an optimum solution.

MATERIAL QUESTIONS

Non-corroding stainless steel in water management

Austenitic chromium / nickel steels are normally used in water management and particularly in the field of drinking water supply. Because of the nickel content, the question repeatedly arises here as to weather the nickel content in the drinking water can be increased. In order to solve the problem that gives rise to the question, it is necessary to deal to some degree with materials science.

Why is stainless steel non-corroding?

The corrosion resistance of stainless steel is attributable mainly to the presence of chrome as an alloy component, the necessary content being at least 12%. Chrome forms an extremely thin but very resistant chromium oxide layer on the surface of the steel. This oxide layer protects the iron molecules against oxidation and makes the steel passive to a certain degree. For this reason, this layer is also referred to as the passive layer. In simple terms, it can be said that the actual stainless steel has absolutely no direct contact with the medium, but is separated from it by a thin skin.

What does nickel do?

Nickel is an element that occurs ubiquitously throughout the world. As an 'austenite former', it is the most important alloy element of the austenitic non-corroding steels and permits this form even at room temperature.

Austenite designates a special crystallization form of the mixed crystals, which in unalloyed steels otherwise occurs only at temperatures above 906 °C.

Here, the alloy element **nickel is permanently incorporated into the crystal structure** and is not applied to the surface - like for example in nickel-plating.

The austenitic chromium-nickel steels that are mainly used in the water supply display chrome contents of at least 18 % and nickel contents of at least 10 %.

Corrosion

The process of metal removal is referred to as corrosion. In aqueous solutions, corrosion is always attributable to basic electrochemical processes, with the metal serving as and electron conductor and the solution as an ion conductor. A prerequisite for the presence of corrosion is therefore direct contact between the medium and the metal and a corresponding electrochemical potential.

Otherwise, a corrosion process cannot take place. Mobilization of nickel from the stainless steel can therefore only occur if the aforementioned conditions are created. The passive layer is, in simple terms, an isolator that first need to be overcome.

Drinking water always contains a certain quantity of ions of the many different materials and is therefore also an electrical conductor. However, normal drinking water is unable to have a corrosive effect on the stainless steel.

Surface-related mass loss rates are for all practical purposes not measurable. For this reason, nickel release also cannot occur.

When does stainless steel corrode?

Strong acids such as hydrochloric acid cause the passive layer to dissolve and result in material removal. High temperatures accelerate this material removal. For example, if very acidic foods are cooked in a stainless steel saucepan for several hours, a small degree of nickel release can occur. The acid treatment is also used in a targeted way to pickle a stainless steel component. The pickling agent is flushed off the component after the pickling process has been completed. The oxide layer then forms again on the surface with oxygen from the air. This oxidation process can be accelerated using special passivation agents.

Summary:

Non-corroding stainless steel can be used in without any problem to supply drinking water. It is inert and hygienic. For this reason, stainless steel is also used almost exclusively in the foodstuffs industry, for example in the temporary storage of mineral water.

Observed limit value overshoots with regard to nickel in drinking water are normally attributable to an insufficient water quality, interacting corrosively with nickel-plated fittings and long exposure times in domestic installations. However, the possibility of stainless steel influencing water quality can be definitively excluded, as the hypothetical observation below shows.

For example, an increase in the nickel content by 0.001 mg/l (corresponding to 5 % of the drinking water limit value of 0.020 mg/l) and a storage content of 2000 m³ would mean a material removal of **2 g/day**.

With a 10 % proportion by weight, this would correspond to a daily stainless steel loss of 20 g. It goes without saying that this cannot be the case.

Non-corrosive stainless steel can be used with absolutely no problem for supplying drinking water, and it should be pressed ahead with by virtue of the excellent hygienic properties of this material.

See also:
DIN 50930 Parts 1 to 5
More information about stainless steel and further links can be found on the Internet under:
www.edelstahl-rostfrei.de
www.euro-inox.org
www.worldstainless.org

Tip

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