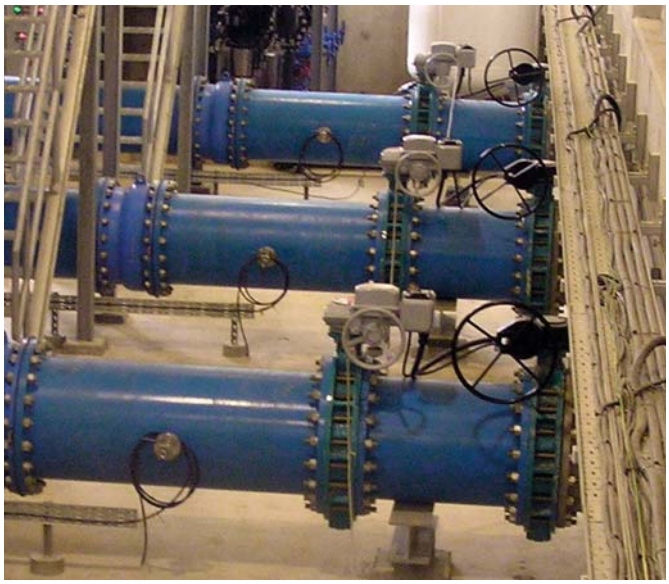
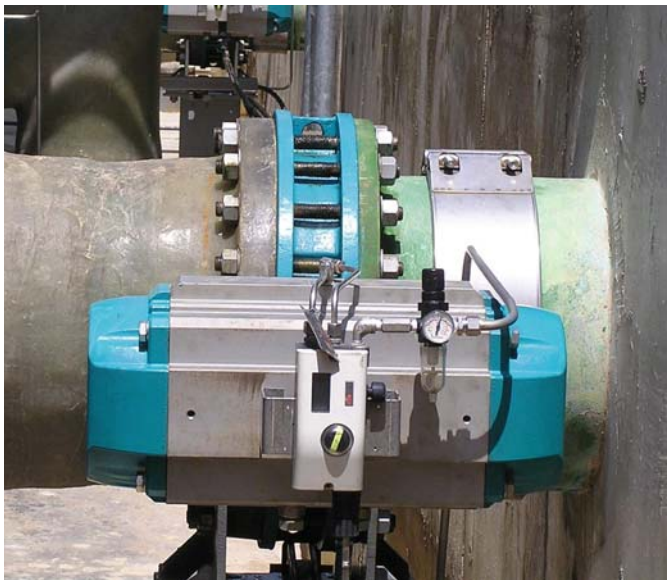
Product Application - Drinking Water

Sea Water Desalination by Reverse Osmosis (RO)





The system

Singapore began tackling their drinking water supply problem a few years ago. The first large sea water desalination system “TUAS Desalination“ was designed and built by Hyflux Ltd. The system operates according to the reverse osmosis principle and produces more than 136,000 m³ of drinking water per day. This amount is enough to fill about 55 Olympic size swimming pools.

Technology and process

Sea water desalination runs in several process steps. The first of these is the drawing of the sea water and feeding into the system. This is followed by a multi-stage filtration, floatation and ventilation to remove suspended matter and undesirable substances dissolved in the water. The filtered water is conditioned with ferric chloride FeCl3, sulphuric acid H2SO4, hydrochloric acid HCl, caustic soda NaOH and other additives for reverse osmosis and set to a specific pH value. Without these important water treatment steps, the downstream osmosis diaphragms would become useless in no time.

After conditioning of the water, it is fed to the osmosis diaphragm modules by high-pressure pumps. The systems have a modular structure so that the diaphragms can be backwashed at regular intervals. In a system with 10 modules, for example, one of them is always in backwash mode whilst the others produce drinking water. In the last part of the system, after the reverse osmosis, which supplies almost distilled water, the water is brought back up to drinking water quality mineral content. This is the final process step before the water is fed into the distribution pipes and sent on its way to the consumers.

The GEMÜ solution

GEMÜ supplied more than 760 valves in nominal sizes from DN 15 - 1400 for this project. To offer the customers a package solution, valves have also been purchased from partner companies. The customer could therefore be offered everything from one source.

Butterfly valves with the different disc materials in 1.4408, bronze or ECTFE coated are mainly used in the sea water inlet, in the filtration/floatation and in the supply (tanks and pump stations). The nominal sizes are between DN 65 - 1400, the operating pressure is 2.5 – 18 bar depending on the process area. Pneumatic and electric motor solutions as well as manual operators with hand levers and gears.

In water pre-treatment and post-treatment, highly chemically resistant diaphragm valves made of PVC or PVDF are used for dosing FeCl3, H2SO4, HCl, NaOH etc. The nominal sizes are between DN 15 - 40, the operating pressure approx. 3 - 5 bar. Float flow meters of nominal sizes DN 20 – 40 are also installed. Chemical dosing is fully automatic so the valves are usually controlled pneumatically.

The high pressure and non-return valves on the pump stations in front of the osmosis modules are made of special materials such as Super Duplex A890. They are controlled pneumatically and equipped with intelligent positioners. The differential pressure in the start-up phase of a pump is up to 59 bar. The operating pressure is usually between 5 – 84 bar, the valves are designed in DN 300 throughout.

GEMÜ Marketing-Services
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