

عنوان مقاله:

Impact of Element Configuration in SWRO Desalination

محل انتشار:

کنفرانس بین المللی نمک زدایی و تصفیه آب (سال: 1399)

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خلاصه مقاله:

Decreasing the cost of water treatment at no detriment of its water quality is a goal-directed objective in the sea water reverse osmosis (SWRO) market, which plays a determining role in the success of a bid in a tender. Therefore, a clever design to fulfil the market requirements is of practical interest. Herein, using WAVE software (DuPont), a reverse osmosis desalination plant with daily capacity of 840000 m³ was designed to evaluate the techno-economic feasibility and competitiveness of various designs. The number of elements per pressure vessels (NE) and active area of membrane elements (AE) were taken as varying factors for the simulation of different scenarios. Moreover, the internally staged design (ISD) for better flow distribution across the pressure vessel (PV) was applied and compared to the conventional design. Taking consideration of the design of two of the largest desalination plants in the world and Middle East, feasible technical trends alongside of their pros and cons were also discussed and as a conclusion the most cost-effective design was introduced. The results showed that the capital costs reduced by roughly 11% when 8-element configuration with the highest membrane active area was applied compared to 6-element design. Moreover, it was demonstrated that with the successive increase of NE, the higher recovery rate can be achieved. The results of the ISD approach demonstrate well the feasibility of utilizing different membrane element types within a PV in the improvement of flow distribution across the PV in order to minimize the fouling and to improve the lifespan of the membrane and thus the reduction of energy consumption and capital costs.

کلمات کلیدی:

SWRO cost reduction, Element per pressure vessel, Element active area, Internally staged design

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