

## Optimum RO system design with high area spiral-wound elements

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### ABSTRACT

The membrane and spiral-wound elements used for seawater desalination continue to evolve, particularly in regards to lowering energy costs. Most recently, high area elements and ultra low pressure seawater reverse osmosis (SWRO) elements have come onto the market. Laboratory and pilot testing of these elements demonstrate that they can achieve both high rejection and low pressure operation. Use of these high performance SWRO products is a challenge, however. Detailed analysis indicates that the higher permeability membranes have a greater flux imbalance in the process, but there are ways to take advantage of these capabilities with proper system design. An example of the use of high area seawater membranes will be presented. It shows that significant capital savings can be achieved. Using high area elements to run at lower flux is also possible, but the economic gain is only realized when operating a one pass system.

*Keywords:* RO design; Membranes; Spiral wound; Seawater reverse osmosis

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