



Seven-effect $2 \times 4500 \text{ m}^3/\text{d}$ low temperature multi-effect desalination plant. Part II: A comparative analysis

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ABSTRACT

The operation parameters and performance comparison analysis of seven-effect $2 \times 4500 \text{ m}^3/\text{d}$ low-temperature desalination system matched with the Indramayu $3 \times 330 \text{ MW}$ coal-fired power-plant were highlighted in this paper. The mathematical model, parameters and materials of the plant are described in detail. The coupling technologies of multi-effect evaporation, multi-stage flash and steam compression are discussed. The influences of the number of effect evaporator on the system GOR, amount of intake seawater, mass flow rate of motive steam and the specific heat transfer area were investigated. The thermal efficiency of the system is fully improved by using a steam compressor during desalination. The best suction pressure of TVC is obtained through numerical analysis of the effect of suction pressure on GOR and amount of cooling seawater. The testing results under the design condition demonstrated that the gained output ration could be increased to 10.3. The error between the operation performance parameter and model values is less than 5%. The operation performance parameters are better than the model calculation values, thereby confirming the accuracy of the established model. This model can provide a reliable tool for approach and determination method of key technical parameters of large scale MED-TVC device, especially for the research and application of desalination facility in the dual-purpose power plant.

Keywords: Number of effect evaporator; Design calculation model; Thermal efficiency; Energy consumption; Performance analysis

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