Analysis of adjusting method for load performance of TVC-MED desalination plant

Bo Zhang, Luopeng Yang*, Shengqiang Shen, Xiaohua Liu, Kun Zhang

Key Laboratory for Sea Water Desalination of Liaoning Province, School of Energy and Power Engineering, Dalian University of Technology, Dalian 116024, China
Email: yanglp@dlut.edu.cn

Received 5 March 2012; Accepted 18 July 2012

ABSTRACT

Multi-effect distillation (MED) desalination with thermal vapor compressor (TVC) is widely used in a dual-purpose power plant configuration. Due to the variety of extraction pressure and water demand, it works under a wide range varying from over-rated load to less than half-rated load. The adjusting method of load performance is presented to obtain the optimal performance of MED-TVC desalination plant based on the operating characteristics of TVC and MED. With adjustable TVC, the thermodynamic performance of MED-TVC is analyzed when water load and extraction pressure varies. The effect of the variation in feed seawater flow rate, together with the heating steam temperature of the first evaporator, is also investigated. The results of the analysis are fairly close to the data of a practical MED-TVC plant, which justifies the expectation that the analytical method is accurate and reliable.

Keywords: Multi-effect distillation; Thermal vapor compressor; Adjusting method; Load performance

*Corresponding author.

Presented at the International Conference on Desalination for the Environment, Clean Water and Energy, European Desalination Society, 23–26 April 2012, Barcelona, Spain