

Study on heat and moisture exchange characteristics of counter-flow wet seawater shower cooling tower

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Abstract

Cooling tower is an important part of circulating cooling water system. This paper studies the counter-flow wet seawater shower cooling tower, establishes and verifies the detailed thermal performance calculation model. The influences of salinity, inlet velocity and droplet diameter on cooling efficiency, heat dissipation, gas-phase thermal efficiency and exergy efficiency were analyzed. The results showed that the cooling efficiency, exergy efficiency, gas-phase thermal efficiency and heat dissipation of the upper jet column were 15.59%, 4.89%, 8.62% and 34.58% higher than those of the lower jet column, respectively. With the increase of droplet diameter, decreased by 38.76%, Q decreased by 78.11%, decreased by 26.30% and decreased by 33.53% under standard salinity conditions. Under high salinity conditions, is reduced by 35.1%, is reduced by 17.16% and is reduced by 30.55%. With the increase of air velocity, increased by 13.76%, Q increased by 22.44%, decreased by 6.66% and decreased by less than 2% under the standard salt condition. Under high salinity conditions, compared with the standard salinity, the average reduction of is 2.96%, the average reduction of is 1.63% and the average reduction of is 2.73%. Through the optimization analysis of seawater cooling tower, it is obvious that selecting the best operating conditions can improve the heat and moisture exchange characteristics of seawater cooling tower.

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