Integrated Cooling Tower for Fertilizer Complex a new Approach

Author

Mr. Prem Baboo
Dangote Fertilizers, Nigeria

Abstract

The objective of this study is to investigate experimentally and theoretically heat and mass transfer characteristics of the common cooling tower for world largest Fertilizers complex and Induced cooling system is also world largest cooling Tower. This theory is universally adopted for calculations of cooling tower performance. Detail of these design parameters and other characteristics of manufactured cooling tower are mentioned in design methodology section. Effectiveness of 55% to 85% was obtained from experiments. Cooling tower process is generally related with vapour pressure of water and humidity. Cooling tower sizing can simply be done by graphical methods. Some additional calculation such as water make-up, fan horsepower calculations are also explained in this article. Sources of error include increase in humidity of surrounding air after one complete trial, the area near Atlantic Ocean hence humidity changed frequently. Due to this air becomes saturated and becomes a cause of decrease in effectiveness. Drift losses are also a cause of error in experimental results. Cooling towers are heat removal devices used to transfer process waste heat to the atmosphere. These cooling towers are found at really big dimensions at Dangote Fertilizers plants. The primary use of large, industrial cooling towers is to remove the heat absorbed in the circulating cooling water systems used in Dangote Fertilizer Train -1 & Train-2 Ammonia, Urea and Granulation with common utilities plants. These things have to be so big to be able to cool the water in a constant rate. The Cooling water system is provided mainly for ammonia and urea process cooling requirements and for relevant auxiliary systems, based on evaporative cooling cells of conditioned water routed to the users and then returned to the cooling towers for restoring the proper temperature before being recycled to the users. It can be concluded that proper packing, shut down strategy and water distribution are important for optimization of cooling towers. It is important to identify such factors and optimize these for efficient working of cooling towers.