ABSTRACT

Cooling tower is one of the important components in a cooling system that functions as a tool to cool the condenser output water which is contacted directly with environmental air by forced convection using a fan. In this final project, a study of the realization and testing of cooling towers for Thermoelectric Cooler (TEC) based chillers and their performance was evaluated. The parameters needed to evaluate cooling towers are temperature, volume flow rate, and air humidity. After all the parameters obtained, the performance of the cooling tower is the heat release capacity and effectiveness can be evaluated. In this study various experimental conditions were carried out, such as regulating thermoelectric voltage, cooling tower water flow rate, and fan voltage. TEC voltage stimulus variations and fan voltage are 3 V, 6 V, 9 V, and 12 V. While variations in the flow rate stimulus for cooling tower water volume are 1 LPM, 2 LPM, and 3 LPM. Data retrieval is carried out in conditions outside the room with a state of environmental air flowing and exposed to sunlight. The data collection results were obtained for the largest large heat discharge capacity of 220.5 J / s at 12 V TEC voltage with a flow rate of 3 LPM water volume and 12 V fan voltage. The smallest heat removal capacity of 14.28 J / s at TEC 3 V voltage with a water volume flow rate 1 LPM 9 V and 12 V fan voltage. The heat release capacity depends on the speed of the water mass flow rate and the difference of the water temperature input output of the cooling tower. The greater value of both, the greater heat release capacity. The highest value of effectiveness is 21.25% at TEC 9 V voltage with a flow rate of 1 LPM water volume and 12 V fan voltage. The lowest value of effectiveness is 2.71% at TEC 12 V voltage with a flow rate of 2 LPM water volume and 12 V fan voltage.

Keywords: *Cooling tower, TEC-based chiller, heat release capacity, effectiveness*