

m Switch Project

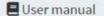
## ICCHMT2023

◀ Your Submissions

**↓** INTENTS ↓

Review

Discuss







## Paper 154

Title Submitted

Energy Performance Analysis of Dew Point Evaporative Cooler with Novel Heat and Mass Exchanger Design

December 10, 2023 to ICCHMT2023

Category Status

Status History

6 previous version(s)

Paper

final

## Authors

Mohammed



Sulaiman Erbil Polytechnic University, Mechanical and Energy Engineering Department, Erbil, Iraq



Ahmed M. Adham
Department of Technical
Mechanical and Energy
Engineering, Erbil
Technical Engineering
College, Erbil
Polytechnic University,
Kurdistan Region, Erbil
44001, Iraq
ahmed.adham@epu.ed
u.iq

**Edit Final Version** 

Go To Submission

Contact Authors

## Abstract

This paper investigates the energy performance of a novel dew point evaporative cooler (DPEC) with a new shell and tube design heat and mass exchanger. The shell is assigned as a wet channel, and the tubes are assigned as dry channels. The results obtained from the numerical simulation have been validated against the experimental data and compared to the conventional DPEC, namely, flat-plate type DPEC, under a wide range of operational and geometrical conditions. The obtained results revealed that, when compared to the conventional flat-plate type, the energy efficiency has significantly improved (as high as 35%) due to a significant decrease in pressure drop, which eventually led to lower power consumption for the same amount of air flowrate alongside with the increase in heat and mass transfer potential. In addition, it was found that the new cooler recorded the best performance when the channel diameter was smallest (about 3.9 mm); meanwhile, the channel length of 1.3 m, air velocity of 1.7 m/s, and air ratio of 0.3 are found to be the optimum values which resulted in the best energy performance for the proposed cooler.