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Numerical and Experimental Investigation of Distance Between Fan and Coil Block in a Fin and Tube Air Cooler Heat Exchanger

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Abstract : Heat exchangers are devices that are widely used to transfer heat between fluids due to their temperature differences. As a type of heat exchanger, air coolers are heat exchangers that cool the air as it passes through the fins of the heat exchanger by transferring heat to the refrigerant in the coil tubes of the heat exchanger. An assembled fin and tube heat exchanger consists of a coil block and a casing with a fan mounted on it. The term “Fan hood” is used to define the distance between the fan and the coil block. Air coolers play a crucial role in cooling systems, and their heat transfer performance can vary depending on design parameters. These parameters can be related to the air side or the internal fluid side. For airside efficiency, the distance between the fan and the coil block affects the performance by creating dead zones at the corners of the casing and maldistribution of airflow. Therefore, a detailed study of the effect of the fan hood on the evaporator and the optimum fan hood distance is necessary for an efficient air cooler design. This study aims to investigate the value of the fan hood in a fin and tube-type air cooler heat exchanger through computational fluid dynamics (CFD) simulations and experimental investigations. CFD simulations will be used to study the airflow within the fan hood. These simulations will provide valuable insights to optimize the design of the fan hood. In addition, experimental tests will be carried out to validate the CFD results and to measure the performance of the fan hood under real conditions. The results will help us to understand the effect of fan hood design on evaporator efficiency and contribute to the development of more efficient cooling systems. This study will provide essential information for evaporator design and improving the energy efficiency of cooling systems.

Keywords : heat exchanger, fan hood, heat exchanger performance, air flow performance
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