Abstract

A set of the experiments were carried out to investigate the turbulent flow and heat transfer behavior in a double pipe counter water flow heat exchanger with inserted semi circular disc baffles on the opposite distances from the outer surface of the length of the inner tube. The test section is a horizontal annular passage formed by two concentric tubes with an inner to outer diameter ratio of 0.3. Heat is only transferred from the annulus to the inner tube while outer tube is well insulated. Semi circular disc baffle with dimensions of 18 mm outer radius, 6.25 mm inner radius, and 1 mm thickness are used in the present study. The effect of turbulence on heat transfer and pressure drop was compared with the values for smooth tube. The effect of semi circular disc baffle was depended on the basis of varying the baffle spacing. All the results and readings were compared with the standard data from the smooth tube. In the beginning we conducted the experiment without any baffle to get the value for plane heat exchanger and with baffles with varying baffle spacing (15 and 45) cm. The effects of the baffle spacing and flow Reynolds number on the thermal performance were examined. Whenever it comes to enhance the heat transfer between the surfaces. The pressure drop does play an important role and becomes another important factor to be considered and to be kept in mind. The maximum value of performance ratio (efficiency enhancement) was found for insert with baffle spacing (15 cm). Nusselt number and friction factor are higher than smooth tube depending on the baffle spacing and mass flow rate of the working fluid. New correlations based on the present experimental data for predicting Nusselt number and friction factor for the
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heat exchanger with and without baffle have been proposed. The proposed correlations can predict the experimental data with average relative error of ± 7.8% for Nusselt number and ± 6.5% for friction factor.

References


Index Terms

Computer Science

Applied Sciences
Keywords

Double pipe  Semi circular disc baffles Heat exchanger