

## Accepted Manuscript

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PII: S1359-4311(17)36171-9  
DOI: <https://doi.org/10.1016/j.applthermaleng.2018.02.001>  
Reference: ATE 11783

To appear in: *Applied Thermal Engineering*

Received Date: 23 September 2017  
Revised Date: 5 January 2018  
Accepted Date: 1 February 2018

Please cite this article as: E.M.S. El-Said, M.M.A. Al-Saad, Experimental Investigation of Air Injection Effect on the Performance of Horizontal Shell and Multi-Tube Heat Exchanger with Baffles, *Applied Thermal Engineering* (2018), doi: <https://doi.org/10.1016/j.applthermaleng.2018.02.001>

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# Experimental Investigation of Air Injection Effect on the Performance of Horizontal Shell and Multi-Tube Heat Exchanger with Baffles

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## Highlights

- Shell and multi-tube heat exchanger performance is investigated using air injection method.
- A novel air bubbles injection method is designed and carried out.
- Different air flow rates along with different shell side water flow rates are considered.
- All performance parameters are increased significantly due to the injection of air bubbles.

## ABSTRACT

This paper presents a laboratory experiments for investigation of air injection into the shell side of shell-and-multi-tube heat exchanger aims to augment the thermal performance. The air has been injected inside the heat exchanger shell with two methods (cross injection from shell wall and parallel injection from the shell front side) and different air flow rates to estimate the optimum performance conditions. The air and shell side water flow rates were changed between 1-5 LPM and 12-21 LPM respectively with constant tube side water flow rate. Also, pressure loss between the shell side outlet and inlet caused by air bubble injection was measured to know the power loss in heat exchangers under enhancement technique. The results presented that the injected air flow rate and injection method have a significant impact on the heat exchanger performance enhancement. And also presented that, increase of air flow rate increases the overall heat transfer coefficient ( $U$ ). The effect of air bubble injection on effectiveness ( $\varepsilon$ ),  $U$  and  $NTU$  of heat exchanger in first method flow

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