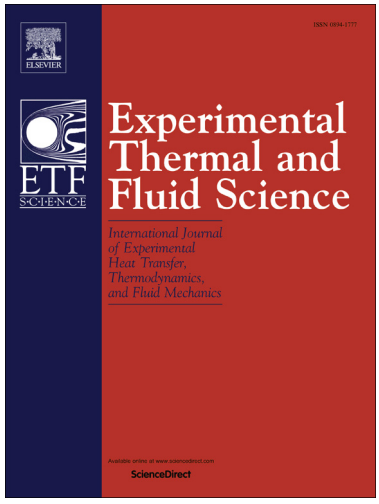

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PII: S0894-1777(17)30098-5
DOI: http://dx.doi.org/10.1016/j.expthermflusci.2017.04.001
Reference: ETF 9063

To appear in: *Experimental Thermal and Fluid Science*

Received Date: 14 March 2016
Revised Date: 13 March 2017
Accepted Date: 2 April 2017

Please cite this article as: A. Sarmadian, M. Shafaee, H. Mashouf, S.G. Mohseni, Condensation Heat Transfer and Pressure Drop Characteristics of R-600a in Horizontal Smooth and Helically Dimpled Tubes, *Experimental Thermal and Fluid Science* (2017), doi: http://dx.doi.org/10.1016/j.expthermflusci.2017.04.001

Condensation Heat Transfer and Pressure Drop Characteristics of R-600a in Horizontal Smooth and Helically Dimpled Tubes

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ABSTRACT

In the present study, condensation heat transfer and frictional pressure drops of refrigerant R-600a (iso-butane) inside a helically dimpled tube and a plain tube of internal diameter 8.3 mm were measured and analyzed. All tests were performed at different vapor qualities up to 0.82 and average saturation temperatures ranging between 38 and 42℃. Refrigerant mass fluxes varied in the range of 114-368 kg/m^{2}s. The inner surface of the helically dimpled tube has been designed and reshaped through three-dimensional material surface modifications consists of both shallow and deep protrusions which are placed evenly in helical directions on the tube wall. The experimental results show that the heat transfer coefficients of the dimpled tube are 1.2-2 times of those in smooth tube with a pressure drop penalty just ranging between 58% and 195%. The highest heat transfer coefficient is occurred at vapor quality of 0.53 and mass flow rate of 368 kg/m^{2}s. On the other hand, the maximum increase of pressure drop takes place at vapor quality of 0.55 and mass flow rate of 368 kg/m^{2}s.