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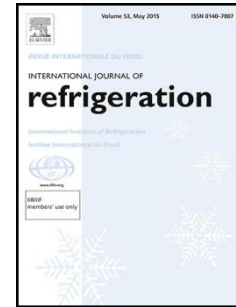
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## Two-phase pressure drop and flow boiling heat transfer in an enhanced dimpled tube with a solid round rod insert

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### Abstract:

An experimental study was conducted on a 19.05 mm (outer diameter) dimpled enhanced tube to evaluate the in-tube two phase heat transfer and pressure drop performance in an annular section created between the enhanced tube and a solid round PVC rod. The purpose of the study was to understand the effect of forced early transition to annular flow on the pressure drop and heat transfer coefficient in a horizontal tube. The refrigerant studied was R-134a at a saturation temperature of 5°C, heat flux range 2.5 to 15 kW m<sup>-2</sup>, mass flux from 80 to 200 kg m<sup>-2</sup> s<sup>-1</sup> and inlet vapor quality of 0.12 to 0.72. Flow pattern and pressure drop results were obtained under adiabatic conditions. Under similar operating conditions the enhanced tube with a rod exhibited three times higher heat transfer performance versus same size smooth empty tube with lower pressure drop penalty at lower mass flux.

### Keywords:

*Shell and tube DX evaporator, enhanced tube, heat transfer coefficient, pressure drop*

### Symbols and Nomenclature:

<i>A</i>	Annular flow pattern
<i>AP</i>	Absolute pressure [kPa]
<i>D</i>	Dry-out region
<i>d</i>	Diameter [m]
<i>DP</i>	Differential pressure [kPa]
<i>DX</i>	Direct expansion
$\Delta P$	Pressure drop [kPa]
<i>f</i>	Darcy type friction factor [-]

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