

Boiling Heat Transfer and Pressure Drop of a Refrigerant Flowing Vertically Downward in a Small Rectangular Tube

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Experiments were performed on flow boiling heat transfer and pressure drop of refrigerant R410A flowing in a vertical small copper rectangular tube with 1.04 mm inside hydraulic equivalent diameter for the development of a high-performance heat exchanger using small tubes or multi-port extruded tubes for air conditioning systems. Local heat transfer coefficients were measured in a range of mass velocities from 30 to 200 kg m⁻² s⁻¹, heat fluxes from 1 to 16 kW·m⁻² and qualities from 0.05 to 1 at evaporation temperature of 10°C. Pressure drops were also measured at mass velocities from 30 to 200 kg·m⁻² s⁻¹ and qualities from 0.1 to 0.9 at saturation temperature of 10°C under the adiabatic condition. The characteristics of frictional pressure drop, heat transfer coefficient and dry-out quality were clarified by comparing the measurements with the data for the circular tube of 1.00 mm inside diameter previously obtained.