

Heat Transfer Model for Near-Critical-Pressure Condensation of Refrigerant Blends in Microchannels

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A study of heat transfer in refrigerant blends R404A and R410A flowing through small diameter tubes was conducted. Smaller tubes lead to higher heat transfer coefficients and are better suited for the high operating pressures characteristic of systems using these refrigerants. Heat transfer coefficients for R410A were measured across the entire vapor-liquid dome at 0.8, 0.9 times the critical pressure in three different round tubes ($D = 3.05, 1.52, 0.76$ mm) over a mass flux range of $200 < G < 800$ kg/m²-s. The data from this study were used in conjunction with data obtained under similar operating conditions for refrigerants R404A and R410A in tubes of diameter 6.22 and 9.40 mm to develop condensation heat transfer models in tubes with diameters ranging from 0.76 to 9.40 mm during condensation.