

## Equations of State and Thermodynamic Properties of Mixtures R290/R125 and R290/R744.

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The mixtures R290/R125 and R290/R744 are perspective refrigerants. Therefore equations of state for them were compiled on the basis of experimental data using the model of Lemmon and Jacobsen [1]. The data for mixture R290/R125 (364 p,ρ,T,x and 650 p,T,x points from 6 sources) cover the ranges 253–423 K, 0.1–6.7 MPa. For mixture R290/R744 1118 p,ρ,T,x and 817 p,T,x points from 12 sources cover the ranges 211–511 K, 0.06–70 MPa. The values of density for p,T,x-data were calculated by auxiliary equations compiled on the basis of p,ρ,T,x-data. For satisfaction of phase equilibrium condition 54 points at 253–348 K for first mixture and 65 points at 222–361 K for the second were used. At calculations the reliable equations of state for the components were used. The coefficients of interaction functions for mixtures were defined on the basis of step-wise regression analysis proposed by Reuck and Armstrong [2]. The root mean square deviations of density values calculated by compiled equations of state from experimental data are equal 0.19% for mixture R290/R125 and 0.39% for R290/R744. By means of compiled equations the tables of density, enthalpy and entropy, covering for mixture R290/R125 the range 240–400 K, 0.05–6 MPa and for R290/R744 – 220–500 K, 0.05–70 MPa, were calculated and the phase behavior of mentioned mixtures was investigated. The differences of temperature of condensation and boiling on isobars are lower than 2 K for first mixture at mole fractions 0,6 and 0,8 R125 and 5 K for the second at mole fraction 0,9 R744. The deviations of tabulated values from calculated by well-known system REFPROP mainly don't exceed 0,4 %, 4 kJ/kg and 0,01 kJ/(kg·K). Therefore the obtained values of properties may be used for calculation of refrigerating plants.

[1] Lemmon E.W., Jacobsen R.T. *Int. J. Thermophysics*, 20, 825-835 (1999).

[2] Reuck K.M., Armstrong B. *Cryogenics*. 19, 505-512 (1979).